GAS JOURNAL

LIGHT ✂ HEAT ✂ POWER ✂ BYE-PRODUCTS

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Editorial Notes.

Gas Undertakings Bill.

ADMITTEDLY a non-contentious measure, it was not to be expected that the Gas Undertakings Bill, which has now passed through both Houses of Parliament, would go far towards giving effect to the proposals put forward by the National Gas Council in 1926 for the comprehensive amendment of the law relating to the gas supply service of this country. Having in mind, however, the reluctance of successive Governments to face the fact that new legislation has for a long time past been obviously necessary, it behoves us to be thankful for small mercies, and to lay greater stress upon the fact that the present Government has been stirred to action than upon the results which have flowed therefrom.

Not that these results lack importance. Several glaring anomalies have been removed; and a careful scrutiny of the clauses of the Bill reveals the fact that substantial advantages, not perhaps at first sight apparent, have been gained. The cheapening of procedure in certain cases secured by the substitution of Departmental for Special Orders, thus avoiding the cost and delays necessarily involved in submitting an Order to both Houses of Parliament, is a substantial benefit, particularly to small undertakings which in the past have often found the cost of the Special Order procedure prohibitive. There is, of course, ample scope for the eventual extension of the Departmental Order procedure; but the powers which may now be secured in this way under the Bill are both important and useful, and our only complaint is that there are not more of them.

The Bill being a Public Bill of general application will also lead to some saving in the cost of obtaining Special Orders, in that it will no longer be necessary to incorporate in such Orders general provisions set out in the Bill. Thus the borrowing powers of all statutory company undertakings are *ipso facto* raised to an amount not exceeding one-half of the aggregate amount of the paid-up share capital and of any premiums paid in respect thereof. Only in cases in which a company seek to exceed the limit of one-half will it be necessary to have recourse to the Board of Trade. In the same way, a general permission to increase the reserve fund, or the special purposes fund, is accorded by the Bill. The Residuals Clause, the importance of which should not be overlooked, as it materially extends the power of purchasing residual products, is another example of a general provision which now automatically takes the place of the Model Bill provisions regarding residuals contained in so many Special Acts.

The provisions of clause 8 and of the relative schedule are important, and in particular those amending section 1 of the Gas Regulation Act. A number of undertakings have suffered from the faulty drafting of the section in question, and they will shortly have an opportunity of obtaining an Amending Order affording them the benefits of which they have hitherto been deprived. A clause of the Bill which must clearly have emanated from the Board of Trade is that imposing upon undertakings producing more than 20 million c.ft. of gas annually the obligation to adopt the thermal system of charge. Undertakings producing more than the prescribed limit can have no reasonable objection to the exercise in the manner proposed of a power already possessed by the Board of Trade under the Gas Regulation Act. On the other hand, small undertakings can take comfort from the fact that the clause constitutes a tacit recognition of the impossibility of closely controlling the calorific value of gas produced from a small-sized plant with limited storage capacity, and of the undesirability of imposing the additional cost which such control would entail.

Need for Still Further Powers.

THE absence from the Bill of any provision granting further facilities for co-operation and joint working cannot but be regretted by all who have the interest of gas supply at heart. We believe that the inclusion of such provisions was vigorously pressed for, but that the authorities responsible took the view that they would provoke discussion and thus jeopardize the passage of the Bill. Never was the need for powers to rationalize more clearly felt. Other industries are re-organizing and entering into joint working arrangements of the most comprehensive character, most of them without any need to have recourse to Parliament or any other authority for permission. Gas undertakings, on the other hand, tied hand and foot by legislation which regards them as entirely self-contained units, cannot move in the direction in which they are impatiently waiting to move until parliamentary powers are conferred. Such a state of affairs cannot, in the interests of gas consumers, of those engaged in the manufacture and supply of gas, and indeed of the country at large, be allowed to continue. Further legislation, and on a generous scale, must follow if the gas industry is not to have its development dangerously hampered, and to be seriously crippled in the struggle with its competitors. While, therefore, all those concerned welcome the new Bill, and are grateful for what it contains, they welcome it still more because it indicates an awakening in Government circles from the apathy and torpor which have prevailed so long. Its very incompleteness shows it to be only an instalment of what will be accorded as soon as time and circumstances permit. It concedes, moreover, the principle that existing machinery for obtaining powers is unnecessarily costly and cumbersome; and there can be no reason for refraining to extend to many other kindred matters the simpler and cheaper procedure now extended to a few.

In these circumstances, we feel that those responsible should be congratulated upon what they have already achieved, and that the auspices are favourable.

The Berlin Exhibition.

In another part of this issue, we give a résumé of some of the speeches at the opening of the Gas and Water Exhibition, Berlin, 1929, which took place on April 19. We have the word of a Minister of State for it that it is the largest of its kind ever held, and we congratulate the German Gas and Water Association on the success of their enterprise. It is characteristic of German thoroughness that there is a special municipal department in Berlin which specializes in the organization of exhibitions, and has at its disposal magnificent premises for the purpose. We have little doubt that the collaboration of the exhibition specialists with the technical Association will have produced something really worth seeing.

There are many features of interest in the speeches, and those who intend visiting the Exhibition either in June with the Institution party or independently will be well advised to read them. They set out clearly the present state of development of the industry in Germany, and the circumstances in which it is working. And they show exactly with what objects in view the project was undertaken. It will be noticed that more than one speaker made allusion to attracting the foreigner as one of the principal aims. There is something of a challenge in the claim of one of the speakers that Germany leads the world in gas-works construction, and in the manufacturing side of the industry generally. We well remember the admiration expressed by English visitors to the 1914 Munich exhibition for some of the domestic apparatus shown, and it is safe to assume that many advances have been made since then.

In Herr zur Nedden, who holds an important post in the German National Coal Council, gas has indeed an ardent advocate. His speech placed gas development among the foremost necessities of modern times for Germany, and he is of opinion that great things are to be expected from the various schemes of long-distance supply which are so agitating the established gas industry there at the present time. He may not altogether have pleased his hearers by offering equal welcome to the great Ruhr carbonization-at-the-pithead scheme, the plans of the brown-coal syndicates, or the group gas-works projects of the gas industry. But he stipulated for well-organized systems of whatever kind, and the contention of the Gas Association is that chaos is developing under present conditions. At any rate, long-distance supply is developing there apace, and observation at first hand and discussion of this cannot fail to give additional interest to a visit to Germany in 1929.

An Opportunity.

Quite a number of important topics were touched upon in one form or another during the afternoon and evening proceedings in connection with the annual meeting of the Society of British Gas Industries. The references are recorded elsewhere in this issue; but there is one which we would briefly mention here. Next February seems at the moment to be a long way ahead; but it is not, and if consideration be given at once to plans for the 1930 Birmingham Section of the British Industries Fair, it will be none too soon. There is an immense amount of work to be done in organizing a display on this scale; and unnecessary eleventh-hour effort is to be deprecated. There must, of course, in any case be much that cannot be done until the last moment; but there is also a great deal that can be taken in hand betimes, and with this it is to be hoped there will be no delay.

There is here an opportunity once more presented for a little of that co-operation of which so much was said by different speakers at the Society's annual dinner. It does not go far, perhaps, in the direction desired by those who themselves regard the great gas industry—and wish it to be so regarded by others—as one and inseparable; but nevertheless it is an opportunity to be welcomed, and of which the utmost advantage should be taken. The Council, in their report, mentioned the fact that, in accordance with the recommendation of the Local and National Committees of the Gas Industries Section (which was published in the "Journal" on March 27 last), they have decided again to undertake the organization of a similar Section at the Fair next year, and that they are hoping for the co-operation of the other organizations in the industry. We are confident, as doubtless they themselves are, that this co-operation will in full measure be forthcoming. One direction in which it can be brought into play is the arrangement of another Joint Gas Conference. That which was held during the run of this year's Fair was, Mr. R. J. Milbourne (Chairman of Council of the Society of British Gas Industries) points out, due to the initiative of Mr. John Terrace (the President of the Institution of Gas Engineers); and it proved to be exceedingly popular. So far, indeed, are the exhibitors convinced of the value of such a conference in connection with the Fair, that certain of them, in applying for their space for next year, have made their application contingent upon there being some kind of gas conference held.

The Gas Industries Section of 1929 was the envy of many other exhibitors at the Fair. Let us all resolve that the 1930 Section and its allied Joint Gas Conference shall be the envy of every other industry represented at Castle Bromwich. This result can be brought about, with the well-tuned resources of the gas industry, if the will be sufficiently strong. The opportunity is there, and we hope that it will be seized with both hands.

Gas and Public Health.

It is good that the public should become more closely acquainted with the beneficial effect that gas usage has upon the health and well-being of the community; and we can think of no better method of disseminating this information, through the most influential channels, than that adopted by the British Commercial Gas Association in their District Conferences, two of which have recently been held—at Cheltenham and Aberdeen. Every gas consumer is benefiting his fellows much more than he realizes. Every cubic foot of gas he burns means greater cleanliness and health both within and without his home. At the Cheltenham Conference particular attention was paid to the latter aspect of gas cleanliness—brighter skies and thus more sunshine. A certain Medical Officer of Health stated recently that one in four deaths in 1925 in three London Boroughs was due to some complaint or other of the lungs, and that "the smoke evil is the greatest enemy to people who live in cities."

As distinct from electricity, the employment of gas in the home or in the factory means practically absolute elimination of the smoke evil. Neither gas nor electricity in the home produces dirt; both are clean. But one must go a step further, and consider the relative anti-smoke capacities of gas and electricity not only at the point of application of these refined fuels, but from the time the raw material—in each case coal—is brought to the surface of the earth to the time when the consumer of gas or electricity pays his bills. Examination of the problem on these broad lines leaves no room for doubt, even in the mind of one who may be prejudiced in favour of electricity, that gas is a far cleaner fuel than electricity, and that its extended use will militate more against disease and discomfort than can the greater application of electricity.

An interesting comparison could be drawn between the relative air-pollution caused by gas production and electricity generation. The atmosphere above any modern gas-works is free from smoke. Can the same be said concerning the state of the atmosphere surrounding an electricity generating station? In this regard we refer to visible smoke; but there is another equally important aspect of air-pollution—contamination by sulphurous fumes. It is in this that electricity generating stations are very real offenders. Only a week or two ago we called the attention of our readers to the storm of influential public protest against the erection of an enormous super-power station within a few miles of the centre of London—protest which gains in intensity as the subject is more closely studied. The essence of the protest was that London—its historic buildings, its beautiful parks, and incidentally its inhabitants—should not be made to suffer because a certain electricity undertaking has arrived at the

conclusion that cheap current and long-distance transmission do not go hand in hand. As a solution, it was suggested that the generating units should be situated in the country. This, however, is not a solution which meets with universal approval; and a correspondent to "The Times" of Friday last reasonably states that it is a selfish and mistaken policy to think that the countryside should always be made to suffer for the requirements of the town. This correspondent maintains that the real remedy lies in compelling all power stations, whether in or near towns or far from towns in the open rural spaces, to wash the hurtful sulphur fumes coming from their boiler furnaces, by passing the whole of the fumes through "washing towers in which artificial rain would play the part now played by the rains and fogs of heaven." All this, of course, will have its due effect on the price of current; and "electricity for next to nothing" is far distant.

Service in Practice.

We repeat that the extended use of gas will militate more against disease and discomfort than can the greater application of other "artificial" fuels. This statement, however, is of little moment unless the gas be cheap and the services rendered by the supplying undertaking good. At both the "B.C.G.A." Conferences there was plenty of evidence that due attention is being paid to this all-important question of service. At Cheltenham Mr. A. H. Wyatt, a Director of the Cheltenham Gas Light and Coke Company, and Mr. C. W. Welford, the Commercial Manager, indicated the extent of the facilities offered to the gas consumer by the Company. That concentration on good service has brought its inevitable reward is shown by the fact that since 1920 the amount of gas sold by the undertaking has increased by 35 p.ct.—from 402 million c.ft. in 1920 to over 545 millions in 1928. In 1923, the revenue from the sales of gas appliances and fittings was £5830; last year the figure was £13,551—which demonstrates the remarkable confidence of the public in the use of gas. What the gas industry has done for the housewives of Cheltenham is evidenced by the fact that, in the 10,000 to 12,000 homes in the area, there are 9000 gas cookers on hire, in addition to 2000 purchased during the past five years.

What is being done in Aberdeen was outlined in a paper by Mr. S. Milne, the Engineer and Manager of the Aberdeen Gas Department. "Cookers on loan" is part of the sales policy of the Department; and since the introduction of free cooking appliances seventeen years ago, the sales of gas have shown an increase of 104 p.ct. This increased demand has led to a reduction in the price, which to-day is 5·4d. per therm for the first 10,000 c.ft. per quarter, falling to 4d. per therm. From a study of Mr. Milne's paper, it is obvious that good service has been one of the factors in enabling the Department to sell gas at such a low figure; and in this service, meter inspectors have played an important rôle. "Our meter inspectors," states Mr. Milne, "form the connecting link between the Department and the consumer." The inspectors in Aberdeen, however, are really super-inspectors, for they are trained to overhaul fires and cookers, adjust burners, and handle different types of gas appliances before they are appointed to a district. They visit their districts five times a year—four for meter-reading, and the fifth for examination of all appliances. They remedy minor defects and report any extensive repairs, which are dealt with by a special staff. The advantage of this system is that complaints of whatever description—no matter how trivial—receive prompt attention.

The other chief factor which enables the Department to sell gas at 5·4d. per therm is the efficiency of their coke sales department—in which connection we are in agreement with Mr. Milne that too little publicity, even at "B.C.G.A." conferences, is given to this section of a gas undertaking's service, for it is a service which, in the matter of revenue, is second only to the sale of gas itself. Out of a total of 59,523 tons of coke available for sale last year, the Aberdeen Gas Department disposed of 55,000 tons (41 p.ct. of which was used for domestic purposes) within the city and suburbs—a noteworthy achievement. So popular has gas coke become in the Aberdeen area that during the past winter the Department were given no choice but to refuse orders. Such a demand does not arise unless efforts are made to cultivate it; and in our opinion the reason for the demand lies in the Department's anxiety to serve the poorer classes of the community. They have a "small sales department;" and all who come to the gas-works can have a measure of coke—about 28 lbs.—for 3d. or 6d., according to the price ruling at the time. This small quantity is sold at practically the same rate per ton as is paid by the large users; and, to quote Mr. Milne, "it is a real service to the poorer classes." It is really a matter of courtesy; and every customer, whether he requires 28 lbs. or a thousand tons of coke, should receive the same treatment. There is always the chance that the very small consumer will become a small consumer, and the small consumer a large consumer—a fact which, alas, is by no means universally appreciated.

The One Aim.

With but one object in view—the furthering of the interests of the great industry whose welfare we have so much at heart—we must all feel that the present issue of the "Journal" offers good cause for congratulation. Speakers at the annual dinner of the Society of British Gas Industries on April 30 included Mr. John Terrace (the President of the Institution of Gas Engineers) and Mr. Frank H. Jones (the President of the British Commercial Gas Association). These are well-known men on the gas engineering side, greatly respected and of long-recognized ability; and that they should be taking so prominent a part in what may be termed the public life of the industry, is of good augury. The dinner of the Society was followed closely by a luncheon in London, given by the Chairman and Directors of the Tottenham District Gas Company to the Eastern Counties Gas Managers' Association; and here the interesting announcement was made that Mr. Henry Woodall—another of our leaders on the engineering and administrative side—has consented to be the next President of the British Commercial Gas Association. With its busiest and foremost men thus ready to step forward at the call of duty, the industry will go forward without any faltering.

A Gold Medal for Gas Salesmen.

Gas salesmen will note with satisfaction the announcement made by Mr. R. J. Milbourne at last week's annual meeting of the Society of British Gas Industries, regarding the decision of the Council of the Society to offer a gold medal to be awarded each year to the writer of the best paper read before the Circles during the year. This follows upon the determination already made public of the Institution of Gas Engineers that their gold medal should be given for the best paper read before the Institution, the silver medal for the best District Association paper, and the bronze medal for the best Junior Association. So far the details of the Salesmen's Circle medal have not been arranged; but the proposal is one that will give well-deserved encouragement.

Give Attention to Tar.

Tar has had many ups and downs; but of late years it has been much more in the public eye than was at one time the case. Sir Arthur Duckham, however, points out that there is still a great deal more to be learned about it. He would like to see undertaken by the gas industry a study of possible developments of tar which would increase its value as an item in the balance-sheet. The uses of tar acids, he points out, are being developed in America, and promise exceedingly well.

"Roadstone and Tar."

This is the title of a paper read by Mr. W. E. Cone, Technical Adviser to the British Road Tar Association, before the South of Scotland Branch of the Institute of Quarrying recently. Speaking of the selection of road tar, the author observed that this should be largely determined by the quality and texture of the stone; and the viscosity of the tar should be adjusted accordingly. As the purpose for which tar is intro-

duced is to provide the adhesive property necessary for binding the stone and preventing its attrition, due regard should be given to its chemical and physical characteristics, and its affinity for the stone itself. The surface textures of stones are widely different. Stone which is hard and tough demands the use of a tar of high consistency if the maximum amount of adhesion is to be secured. Stone of crystalline structure resists rather than accelerates adhesion. On the other hand, tar of lower viscosity can be employed with stone of a coarse open structure, for this tends to retain the tar, and the materials become more completely miscible. Such stone is, moreover, usually accompanied by the production of "fines," both in manufacture and in laying the tarmacadam; and the "fines" act as a filler in the tar. The stone should, of course, be thoroughly dry before being mixed.

Influence of Temperature on Road-Making.

Mr. Cone emphasized that the question of the temperature of the stone and the tar is all-important. Not only can overheating the materials destroy the properties of the tar, but it is often responsible for the formation of a thin film of tar over the broken stone, which is totally inadequate to bind the adjacent stones together. It is better to have the heat in the tar than in the stone, because of the greater ease with which it can be controlled. The author suggested that consideration might well be given to the laying of the materials hot. On this point he is of the opinion that the use of granite holds out great possibilities for the construction of surfacings subject to heavy traffic conditions. Hard stone of this kind is particularly suited to a hot-mix process; and where there is no restriction in regard to the location and the handling of the materials, and where they can be delivered hot to the site, use should be made of tars of a viscosity ranging from 250 to 300 seconds, in combination with stone graded from 1¼ in. down to dust. The mixing may be carried out at a temperature of 220° and 250° Fahr. for the tar and the stone respectively.

Igniting Coke by Gas.

No duty is too great, nor is any too small, for gas to undertake. In his Presidential Address to the Society of British Gas Industries (which was reproduced in the "Journal" a week ago), the Marquess of Hartington pointed out that with the passing of time the question of the ignitability of coke as compared with coal should become of less and less importance, as the facilities available for the use of gas lighting devices for coke or coal fires become better known and more universally adopted. This is a use for gas which is at the present time not appreciated at its full value. It represents an appreciable saving of labour; and, in addition, when applied to coal fires, it results, by securing quicker and more thorough combustion of the coal, in a lessening of the smoke nuisance.

Are We Downhearted?

There is sufficient to raise the spirits of the gas industry even on the dampest day, in the statement made at last week's meeting of the Society of British Gas Industries that the newest and most up-to-date garden suburb of London, where nearly 6000 houses have been built, has adopted the use of gas throughout, not only for cooking and heating purposes, but also for lighting. In addition, the schools and streets are gas lighted, 31,000 burners being used for the purpose.

An Apt Quotation.

We have for some time past kept on our desk the calendar of a well-known firm in the gas industry, who forward refills at the beginning of each year. Under each day's date is a well-chosen quotation; and frequently these give rise to serious thought. Our eye was caught at once by that for Friday, May 3: "Many little leaks may sink a ship." There may not be much in common between sailors and those responsible for gas distribution systems; but this is a quotation which may well make an appeal to both!

PERSONAL

Hearty congratulations upon his marriage are offered to Mr. Arthur L. Griffith, the genial Secretary of the Society of British Gas Industries. This happy event took place some little time ago; but it came to our knowledge only a few days back. In an association extending over many years, this is the first time that Mr. Griffith has "let us down." Unremitting in his efforts to render service to others on all possible occasions, when it came to his own affairs Mr. Griffith was silent. That is why our congratulations are belated. However, we are able to couple them now with the announcement of a presentation by the members, past and present, of the Council of the Society of which Mr. Griffith has for so long been Secretary; a cheque having been presented to him during last week's annual meeting. We join with those of the whole of the members of the Society our best wishes for the happiness of Mr. Griffith and his wife.

At a meeting of the Wallasey Council on May 2, the appointment of Mr. Eric Bibby as Deputy Gas and Water Engineer and Manager to the County Borough was confirmed. Mr. Bibby has been at Wallasey for the past nine years, being appointed Engineering and Technical Assistant in 1920, and gaining promotion in 1923 to the post of Senior Assistant Engineer. Since August, 1928, he has carried out the duties of Chief Assistant to Mr. H. B. Holliday, the Gas and Water Engineer and Manager; and his promotion was the unanimous resolution of the Gas and Water Committee. Before going to Wallasey, Mr. Bibby was for five years on the Technical and Engineering Staff of the Liverpool Gas Company, in which capacity he gained extensive experience in mechanical and chemical engineering as applied to gas undertakings. He is a Member of the Institution of Gas Engineers and an Associate Member of the Institution of Water Engineers, and was educated at the Liverpool University and the Liverpool Technical Institute.

We were glad to see our friend Mr. Bernard J. Mullaney, Vice-President of the People's Gas Light and Coke Company of Chicago, who is Vice-President of the American Gas Association, present at the luncheon given by the Chairman and Directors of the Tottenham and District Gas Company to the Eastern Counties Gas Managers' Association at the Hotel Cecil last Wednesday. Mr. Mullaney is enjoying a holiday in this country. Our readers will probably remember that he came over here to address the World Power Conference at Wembley in 1924, when he dealt with the interesting subject of municipal *versus* private ownership of public utilities—see "Journal" for July 30, 1924, p. 459.

Under the Order in Council dated Feb. 6, 1928, the Lord President of the Council has appointed Sir James Alfred Ewing, K.C.B., LL.D., D.Sc., F.R.S., M.Inst.C.E., to be a member of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research, to fill a vacancy occasioned by the death of Mr. Robert Whyte Reid, C.B.E.

Announcement is made of the retirement of Mr. J. Arnold Norcross, Vice-President and General Manager of the New Haven Gas Light Company, from that position, to take effect from June 1. Mr. Norcross has been in the service of the Company for the past twenty-six years. Starting as Engineer and Superintendent, he subsequently became Secretary and Treasurer, and later Vice-President and General Manager. Prior to his connection with the New Haven Gas Company, Mr. Norcross had a wide experience in gas-works design, construction, and operation in connection with the building of gas plant in various countries abroad with the firm of Humphreys & Glasgow, Ltd. His earliest training was with the Consolidated Gas Company of New York. The New Haven Company are retaining the services of Mr. Norcross in an advisory capacity.

OBITUARY.

Sir Percy Kendall Stothert, K.B.E., M.Inst.C.E., died at Bath last Monday, at the age of 65. Educated at Clifton College, he was trained as a mechanical engineer, and was Chairman of Directors of Messrs. Stothert & Pitt, of Bath. He was a Deputy-Lieutenant of Somerset, and a Director of the Bath Gas Company.

Mr. James D. Anderson, who has died at Cookstown, succeeded his father as a Director of the local Gas Company in 1887, and for the last 22 years was Chairman. He was for 42 years a member of the Town Commissioners and the Urban Council.

The death occurred on May 1 of Mr. William Dey, of Knottingley, Vice-Chairman of Directors of the Knottingley Gas Company. For many years deceased was a member of the Knottingley Urban District Council.

NOTES ON NEW BOOKS.

THEORY OF HEAT ENGINES.*

Reviewed by Dr. W. B. DAVIDSON.

This book was originally written in 1913. The author was unfortunately killed in 1915 in the war. A new edition was brought out in 1920; corrections by Prof. Morley having been embodied therein. In the present issue further amendments have been made, and an appendix has been added.

As the preface states, the book was written mainly for engineering students, and covers the ground requiring to be traversed by candidates who wish to sit for the London University B.Sc. Examinations in Engineering. It is, of course, also claimed as being suitable for students reading for the examinations of the Institution of Civil Engineers, the Institution of Mechanical Engineers, the City and Guilds of London Institute, and the Board of Education.

An examination of these claims leads one to the conclusion that they are well warranted. The thermo-dynamical and mechanical principles of the subject are given in complete, yet concise, form; purely descriptive matter being for the most part omitted. At the same time valuable references to important researches are given in footnotes; and these enable the keen inquirer after truth to make further investigations without undue loss of time. Useful recommendations to standard works on special subjects, such as the gas engine, are also to be found throughout the book, which is a treatise to be appreciated more by the student who wishes to cover a lot of ground in a short time than by the experienced engineer who desires to have knowledge of the latest data regarding conflicting theories, or full information on a particular subject.

The budding engineer or undergraduate cannot fail to appreciate the working-out of examples of problems. The numerous questions given at the end of each chapter, to which answers are to be found at the end of the book, enable the reader to put his knowledge to the test.

The information is general, and not always so precise as it might be. For instance, one calorie is stated to be equivalent to 3·96 B.Th.U., whereas as every gas chemist knows, the factor to be taken, as directed by the Gas Referees, is 3·968. This is only one example of a good many inconsistencies in the arithmetic of the text, where figures are sometimes given without due regard to a proper degree of accuracy.

The common error is often committed in the text of writing "1°," &c. (a temperature), for "one degree" (a quantity of heat).

It is most difficult in a book of this kind to choose and keep to one system of nomenclature, especially in dealing with gases; and, indeed, alternatives are often desirable. The author works with degrees centigrade, cubic feet, and B.Th.U. for the most part. One would have liked to have the alternatives of cubic metres and calories for purely scientific study.

On the whole, the book is well worthy of the popularity which its repeated editing indicates.

* "The Theory of Heat Engines," by William Inchley, B.Sc. A.M.I.Mech.E., formerly Lecturer in Engineering at University College, Nottingham. Third edition; with 246 diagrams and numerous examples; pp. 500. Published by Longmans, Green, & Co.; price 12s. 6d. net. 1929.

"ELECTRICIAN" ANNUAL TABLES.

It would be difficult to find such full information concerning electricity supply undertakings, so clearly set out and so trustworthy, as is contained in the "Electrician" Annual Tables. Moreover—and this is well worthy of notice—the price of the Tables (10s.) renders the publication available to practically everyone interested in the subject. The 1929 Edition of this work is the forty-second of the series; and every issue seems to be a little better than its predecessor. Additional information concerning mains and distributors, converting plant, outputs, showrooms, &c., which has been inserted in the present edition, greatly increases the utility of the Tables. The index is excellent. It includes alphabetically not only all the undertakings, power companies, projected schemes, &c., mentioned in the Tables, but also towns receiving supply in bulk. Thus information concerning any town receiving an electricity supply can be ascertained with ease. Details of further European undertakings (Russia excepted) have been included.

* "'Electrician' Annual Tables of Electricity Undertakings." London; Ernest Benn, Ltd. Price 10s. net; postage 9d. extra.

GAS STOCK AND SHARE MARKET.

[For Stock and Share List, see later page.]

THE political situation continued to affect business on the Stock Exchange last week, but a more cheerful feeling prevailed in some of the markets.

Transactions in the Gas Market were normal, and prices were mostly maintained; but there were no improvements of importance. A slight check was reported to the progress of the Imperial Continental Gas Association's Bill in Parliament, which probably accounts for the drop on Friday last of 10 points in the capital stock quotation. Further advances in the ordinary and also in the debenture stocks of the Primitiva Company foreshadow a satisfactory report for the past year. The Continental Union Company are recommending a dividend of 2 p.ct. on a nine months' account, which is equivalent to a rate of £2 13s. 4d. p.ct. per annum, as compared with £1 p.ct. previously paid.

It will be noticed that the Sutton Gas Company's ordinary stock is now quoted on the London Exchange, and is added to the Stock List appearing on another page. This stock, which is quoted at 116-119, is well worthy of the attention of investors. A dividend of 8 p.ct. has been paid for the last two years, and the yield, calculated on the average price, is £6 15s. 4d p.ct. The accounts for the past year show a satisfactory increase in the sale of gas.

The following transactions were recorded during the week:

MONDAY.—Alliance and Dublin 98, Bournemouth 5 p.ct. 13$\frac{1}{16}$, 13$\frac{1}{2}$, "B" 12$\frac{13}{16}$, Bristol 5 p.ct. 90$\frac{1}{2}$, 91$\frac{3}{4}$, British 117$\frac{3}{4}$, 118$\frac{1}{2}$, 5 p.ct. deb., 95$\frac{1}{2}$, Commercial 99, 99$\frac{1}{2}$, Continental Union 127, 128, 128$\frac{1}{2}$, 130$\frac{1}{2}$, European 18$\frac{1}{8}$, 18$\frac{5}{8}$, Gas Light and Coke 19s. 1$\frac{1}{2}$d., 19s. 3d., 19s. 4$\frac{1}{2}$d., 5 p.ct. deb. 101$\frac{1}{2}$, Imperial Continental 437, 438, 439, 440, 442, 443, 444, Maidstone 5 p.ct. 128$\frac{1}{2}$, 129, Primitiva 33s. 7$\frac{1}{2}$d., 33s. 9d., 33s. 10$\frac{1}{2}$d., 34s., 34s. 3d., San Paulo 6 p.ct. pref. 8$\frac{3}{4}$, 8$\frac{7}{8}$, Uxbridge 5 p.ct. cap. 94. Supplementary prices, Bournemouth 7 p.ct. deb. 100$\frac{1}{4}$, 101, Danish 8, 8$\frac{1}{8}$, Harrogate new cons. 168, Yorktown (Camberley) and District new 5 p.ct. pref. 92$\frac{1}{2}$.

TUESDAY.—Bournemouth "B" 12$\frac{5}{8}$, 4 p.ct. deb. 75, British 117$\frac{1}{2}$, 117$\frac{3}{4}$, 118$\frac{1}{4}$, Continental Union 127, 128, 129, 129$\frac{1}{2}$, 7 p.ct. pref. 126, European 17$\frac{3}{4}$, 18$\frac{1}{8}$, 18$\frac{5}{8}$, Gas Light and Coke 19s. 1$\frac{1}{2}$d., 19s. 4$\frac{1}{2}$d., 3$\frac{1}{2}$ p.ct. 63$\frac{3}{4}$, 4 p.ct. pref. 76$\frac{3}{4}$, 3 p.ct. deb. 59$\frac{3}{4}$, Imperial Continental 436, 437, 438, 438$\frac{1}{2}$, 440, 440$\frac{1}{2}$, 442, 443, 445, 446, 448, 449, 450, 452, Malta and Mediterranean 5$\frac{7}{8}$, Primitiva 34s., 34s. 1$\frac{1}{2}$d., 34s. 3d., 34s. 3$\frac{3}{4}$d., 34s. 6d., 34s. 9d., 35s., 35s. 1$\frac{1}{2}$d., 35s. 3d., 4 p.ct. 1st debs. 94, South Metropolitan 104$\frac{1}{2}$, 105$\frac{1}{2}$, 6 p.ct. pref. 108, South Suburban 108$\frac{1}{2}$, 109$\frac{1}{4}$, 5 p.ct. deb. 97$\frac{1}{2}$, Tottenham 3$\frac{1}{2}$ p.ct. 106. Supplementary prices, Cheltenham 4 p.ct. deb. 65, East Surrey "B" 5 p.ct. std. 84, Haslemere and District "B" 7 p.ct. max. 97$\frac{1}{2}$.

THURSDAY.—Bournemouth 7 p.ct. max. 12$\frac{1}{2}$, Cape Town 4$\frac{1}{4}$ p.ct. pref. 6$\frac{1}{2}$, Cardiff 7$\frac{1}{2}$ p.ct. deb. 102$\frac{1}{2}$, Commercial 98$\frac{1}{2}$, Continental Union 128$\frac{1}{2}$, 129, European 17$\frac{1}{2}$, 17$\frac{3}{4}$, Gas Light and Coke 19s., 19s. 1$\frac{1}{2}$d., 19s. 3d., 19s. 4$\frac{1}{2}$d., 3$\frac{1}{2}$ p.ct. max. 64$\frac{1}{4}$, 4 p.ct. pref. 75$\frac{3}{4}$, 76$\frac{1}{4}$, 76$\frac{3}{4}$, 3 p.ct. deb. 59$\frac{3}{8}$, 5 p.ct. deb. 101$\frac{1}{2}$, Imperial Continental 435, 436, 437, 438, 441, 442, 443, 445, 446$\frac{1}{2}$, Primitiva 34s. 6d., 34s. 7$\frac{1}{2}$d., 34s. 9d., 34s. 10$\frac{1}{2}$d., 35s., 35s. 1$\frac{1}{2}$d., 35s. 2$\frac{1}{4}$d., 35s. 3d., 35s. 4$\frac{1}{2}$d., 35s. 6d., San Paulo 6 p.ct. pref. 8$\frac{15}{16}$, South Metropolitan 104$\frac{1}{4}$, 104$\frac{1}{2}$, 104$\frac{3}{4}$, 105, 105$\frac{1}{2}$, 6 p.ct. pref. 109, South Suburban 108$\frac{1}{2}$, Wandsworth 5 p.ct. standard 128. Supplementary prices, Dover 7$\frac{1}{2}$ p.ct. max. 121, 121$\frac{1}{2}$.

FRIDAY.—Bournemouth "B" 12$\frac{1}{2}$, 12$\frac{3}{4}$, British 5 p.ct. deb. 95$\frac{1}{2}$, Cape Town 4$\frac{1}{2}$ p.ct. pref. 6$\frac{3}{4}$, 7, Continental Union 128, 7 p.ct. pref. 128, European 17$\frac{1}{4}$, 17$\frac{1}{2}$, 17$\frac{5}{8}$, Gas Light and Coke 19s., 19s. 1$\frac{1}{2}$d., 19s. 2$\frac{1}{4}$d., 19s. 3d., 4 p.ct. pref. 75$\frac{3}{4}$, 76, 76$\frac{3}{4}$, 3 p.ct. deb. 59$\frac{1}{2}$, 60$\frac{1}{4}$, 5 p.ct. deb. 101$\frac{1}{2}$, Imperial Continental 425, 428, 430, 431, 433, 434, 435, 436, 437, 438, 439, North Middlesex 6 p.ct. 108, Primitiva 34s. 3d., 34s. 4$\frac{1}{2}$d., 34s. 6d., 34s. 9d., 34s. 10$\frac{1}{2}$d., 35s., 35s. 4$\frac{1}{2}$d., South Metropolitan 104$\frac{1}{4}$, 6 p.ct. irred. pref. 108, Tottenham 3$\frac{1}{2}$ p.ct. 106, 106$\frac{1}{4}$, 108. Supplementary prices, Holyhead and N. Wales 8s., 8s. 1$\frac{1}{2}$d., North Middlesex 6 p.ct. pref. 107$\frac{1}{2}$, 108, Pinner 7 p.ct. "B" 6$\frac{3}{8}$, South Shields 7 p.ct. 106$\frac{1}{2}$, Tottenham 5 p.ct. pref. 89, Yorktown and District new 5 p.ct. pref. 92$\frac{1}{2}$.

Loanable credits were more plentiful in Lombard Street; and while 4$\frac{1}{2}$ p.ct. was the usual rate for fresh overnight advances, balances were obtainable at 4$\frac{1}{4}$ p.ct. Discounts were naturally weaker on the Treasury Bill announcement that Bills were allotted at an average of £5 0s. 9·07d. p.ct., being nearly 2s. p.ct. below the previous week's rate, and the lowest since the increase in the Bank Rate on Feb. 7 last.

The Bank Rate is 5$\frac{1}{2}$ p.ct., to which it was raised from 4$\frac{1}{2}$ p.ct. on Feb. 7. The Banks' deposit rate is 3$\frac{1}{2}$ p.ct., and the deposit rates of the Discount Houses are 3$\frac{1}{2}$ p.ct. at call and 3$\frac{3}{4}$ p.ct. at notice.

THE BERLIN EXHIBITION.

Opening Ceremony on April 19.

The great exhibition in Berlin—"Deutsche Ausstellung Gas und Wasser, Berlin, 1929"—was ceremoniously opened on April 19, in the municipal exhibition hall on the Kaiserdamm. Our contemporary, "Das Gas- und Wasserfach," for April 27, contained a full account of the proceedings, from which we give the following abstract.

BURGOMASTER BÖSS OPENING THE GERMAN GAS AND WATER EXHIBITION.

Before what is described as a brilliant assembly of a very large number of guests of honour drawn from every German source of science, technique, and industry, Mr. Mayor Böss opened the proceedings. He welcomed those present in the name of the City of Berlin and its municipal department for the organization of exhibitions, fairs, and entertaining. He thanked the Government for the interest they had taken in the project, and the help they had given, and in particular Dr. Curtius, the Minister of Commerce, who had unfortunately been prevented at the last moment by affairs of State from carrying out his promise to open the exhibition. It had the distinction of being the largest ever held at the Kaiserdamm, and, judged by its contents, the most important. He thanked the German Gas and Water Association for the manner in which they had co-operated in organizing the exhibition, and paid a tribute to the enormous amount of work which had been put into it, especially by Directors Schmidt and Kühne. The exhibition was to be one of two large undertakings by the city in 1929; the other being the holding for the first time of festival sports. Their object was to show to natives as well as foreigners what Berlin had become in the last ten years. They confidently invited criticism.

Objects of the Exhibition.

Deputizing for Dr. Curtius, State Secretary Dr. Trendelenburg performed the opening ceremony. In his introductory remarks, he pointed out what integral parts of our daily lives are gas and water. And yet, how few people have any clear idea of the working of a modern gas-works; of the manner of gas distribution generally; or of the details of water supply. The present exhibition, he said, afforded an unprecedented opportunity of learning all this, and more. Among its objects were to awaken in the general public a thorough realization of the services rendered by gas and water; to show them the construction and working of modern plant in all its phases; and to place before hygienists and other technical circles a bird's-eye view such as they had never had before. Under dual expert guidance—the technical men of the industries concerned and the "exhibition specialists" of the municipality—there had been evolved the greatest gas and water exhibition ever held.

International Trade.

One of its great advantages from the point of view of German commerce was that its subject would appeal to the foreigner. Germany, he claimed, leads the world in the construction of gas-works and gas-apparatus of all kinds, in gas distribution and measurement, and in water-works. It supplies these things to almost every civilized country. The exhibition would, therefore, attract visitors from all lands, to the encouragement of German export trade and commercial relations generally. This would be doubly welcome in view of the present-day tendency of the European nations to make themselves as far as possible independent of former sources of supply—a tendency which is hitting Germany very hard in its present state of commercial duress. This, then, was a further object of the exhibition, born of the necessity to find new, and retain the old, markets.

One more point of view, said Dr. Trendelenburg, was worthy of emphasis. The outsider and casual observer is too prone, in this age of the triumphant advance of electricity, to assume that the day of gas is long past. So far from this being the case, gas consumption is increasing year by year. Gas is still supreme as a heating agent, even if electricity holds the fields for light and power.

Having expressed the thanks of the Government to all who had done so much to produce a work of such national importance, Dr. Trendelenburg declared the exhibition open.

The Gas Industry on its Trial.

Herr Kühne, as Chairman of the Exhibition Committee and President of the Gas and Water Association, was the next speaker. He explained first of all why such seemingly different commodities as gas and water should so often be found running in double harness—a survival of the times when they were practically the only public utility services. The fact that they were united in one leading technical Association had considerably simplified the organization of the present exhibition, to which two years of careful thought had been devoted.

As far as concerned the gas industry, no exhibition had been held since the one at Munich, which had suffered from the outbreak of war in 1914. But there was an additional great inducement to do something at the present time. Questions are to the fore which are of vital moment to the great public which uses light and heat. For the general benefit, elucidation is required as to the form in which the energy contained in coal can be best and most economically transferred to the consumer. For household and industry cheap fuel is a question of life or death. From the national point of view, it is of the utmost importance to decide whether gas production should be by individual works, groups of works, or complete centralization. Vast national wealth is sunk in the gas industry, and is affected by the question. To some, according to the individual point of view, the bye-products of gas manufacture may seem more important even than the gas itself. But the industry wants not only to supply the best possible products at home, but also to export. It is, therefore, one of the chief aims of the exhibition to assist in arriving at a fair judgment on all these questions, and the gas industry claims to be able to show that it has, by a long way, not yet reached the limits of possible development of its service.

Herr Kühne, also, emphasized the importance of the exhibition in relation to German export trade. Intimation had been received from numerous foreign deputations of intended visits, and the German Association were particularly pleased at the prospect of welcoming to their General Meeting, June 10 to 12, a record number of visitors from other lands.

The Place of Gas in Modern Life.

Following the opening ceremony, a congress was held to which the Exhibition Committee invited representatives of various technical bodies, and manufacturers of gas and water plant. With Herr Spaleck, a Director of Messrs. Junkers & Co., in the chair, the principal speaker was Herr Dipl.Ing zur Nedden, Manager of the Technical Economic Commission of the National Coal Council. Without being highly technical, his paper was of considerable interest as showing the trend of thought in gas matters in Germany. "'What Does Gas Mean to Us" was the title, and he described it as "retrospects and

prospects." Gas, he said, is the spirit of coal. Stripped of its earthiness, of its ballast of ash and moisture, it was regarded first of all as a distributor of light. As such, it is often said, gas is finished. But what is the simple truth? That 69 p.ct. of all dwellings, 74 p.ct. of all streets in Germany, and 83 p.ct. of all the Berlin streets are to-day lighted by gas. Germany produces yearly about 40 million incandescent mantles, England 50 millions, and the world at least 150 millions. In other spheres, gas engines generating more than 1¼ million horse-power are at work to-day in Germany. Far too little recognition is given there to the merits of gas for the auxiliary heating of boilers, as for example, at peak hours in electricity generating stations. In the United States in 1927 nearly 70 milliards of cubic feet of gas were used for this purpose. The gas turbine,

A Giant Mantle is a Feature of the Exhibition.

which will most certainly come so soon as the workshop can turn out a material to stand the temperatures, holds out a future for gas for power purposes which is difficult to imagine.

At present, the chief field for gas is as a heating agent. Gas cooking is now a normal procedure, and is used in 85 p.ct. of Berlin kitchens. About one half of the 15 million German households are gas consumers, to a total value of about £15 million a year. Some 70 milliards of cubic feet, or quite half the German output, is used for domestic purposes. Households using gas for their hot water supply have increased since 1914 from 300,000 to one million. And still the domestic consumption per head is only one quarter of that of England and America.

New Processes.

Industry, too, is a large consumer; but here again Germany is far behind other lands, and only at the beginning of possibilities, as compared, for example, with America. There is no better method of dealing with coal than carbonization or gasification. New processes which are appearing daily for the synthetic conversion of coal into oil of all kinds, and which promise independence of foreign supplies, are, after all, almost without exception by way of coke oven gas, coal gas, producer gas, or water gas. But, by their incorporation in coke oven and gas works practice, it should be possible in the reasonably near future to free gas production of much of the encumbrance of solid residual fuel. A large increase in gas consumption is economically of the greatest importance, not only because of the high efficiency of this method of coal consumption as compared with that of electricity, but also because of the indispensability of many of the bye-products. As compared, too, with solid fuels, a bare regard of heat efficiencies does not give a true picture. There must be taken into account the many other virtues of gas. It costs nothing for storage; it saves space and labour, and it leaves no ash; its cleanliness, smokelessness, and the low heat radiation from its apparatus promote health and efficiency of labour, and make for its amenities. Above all, the gas flame, which can be so exactly and automatically regulated, reduces industrial heating to the exactness of a machine, and the quality of the products, of whatever nature, is improved out of all knowledge by its use.

The Means to Reduced Charges.

Gas development by no means implies that other sources of energy must stand still. The output of German gas-works has trebled since 1900 simultaneously with the enormous increase in the consumption of electricity. But increased gas consumption, which is of such great national importance, can only result from continually lower prices. Improvements in working are, of course, helpful in this direction, but in Germany to-day there is something still more important. Capital is short, and money is dear, and so every effort must be made to use to the best advantage the capital invested in the industry. At present, interest on capital accounts for far too high a percentage of the cost of production; and the author referred with admiration to the sliding-scale system of charges, which is hardly known in Germany. He considers its adoption would have a most salutary effect on the gas industry there, and quotes the consumption per head in England of 190 cub.m. yearly, compared with only 55 cub.m. in Germany.

Long Distance Gas Supply.

Sliding-scale charges would undoubtedly offer a means of reducing gas prices and increasing consumption. In the author's opinion, the idea of long-distance supplies from big-scale producers, which is so much to the fore, is a step in the same direction. It constitutes a definite effort towards rationalization, in whatever form it assumes—whether supplies are to come from the Ruhr coke-ovens, the central German brown coal deposits, or from centralized groups of large gas-works. Well-organized systems of this kind are capable of extending the benefits of gas beyond the limits of towns and industry. They can carry them far into the country, and so help to solve many of the problems due to over-population of the urban areas.

To sum up, the aim and object should be an ever-extending use of gas for domestic purposes, and still more in trade and industry, achieved through lower gas charges by the collaboration of producers of all kinds. The importance of this object demands common effort on the part of all—economists, officials, business and technical men alike. Modern developments in the manufacture and uses of gas give them their opportunity. To maintain the standard and improve it, technical education, especially at the universities, must receive increasing attention. Extended use of gas will do much to assist the nation in the commerce of the world, to help in improving the conditions of life, and in achieving a higher standard of culture.

FORTHCOMING ENGAGEMENTS.

May 10.—British Commercial Gas Association.—Manchester District Conference at Southport.

May 10.—Southern Association of Gas Engineers and Managers.—Visit to Exmouth.

May 11.—Yorkshire Junior Gas Association.—Meeting at Leeds. Short papers by Messrs. H. E. Wilde (Bradford), S. T. S. Musgrove (Sheffield), and F. J. Jackson (Sheffield).

May 14.—National Gas Council.—Meeting of the Central Executive Board in the morning at the Hotel Metropole.

May 14.—National Gas Council.—Annual Meeting at the Hotel Metropole, 2.30 p.m.

May 14.—Federation of Gas Employers.—Annual Meeting at the Hotel Metropole, 3.15 p.m.

May 16.—Midland Association of Gas Engineers.—Visit to Shrewsbury.

May 16.—Midland Junior Gas Association.—Annual General Meeting in Birmingham.

May 16.—Wales and Monmouthshire District Institution of Gas Engineers and Managers.—Meeting at Cardiff.

May 24.—North of England Gas Managers' Association.—Annual Meeting.

June 8.—London and Southern District Junior Gas Association.—Visit to Worthing.

June 19.—Association of Statutory Inspectors of Gas Meters.—Annual General Meeting in the County Hall, Westminster: President, Mr. H. N. Barrow, J.P.

July 5.—Manchester District Institution of Gas Engineers.—Visit to the Halifax Gas-Works and to the Works of Messrs. Drakes, Ltd.

Sept. 12.—North British Association of Gas Managers.—Annual Meeting at St. Andrews.

Institution of Gas Engineers.

June 4-7.—Annual General Meeting in London.

HALF-YEARLY MEETING OF THE EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

Visit to the Tottenham Gas-Works and to Watson House.

In all respects the Annual Meeting of the Eastern Counties Gas Managers' Association, which was held on May 1 and 2 under the Presidency of Mr. H. C. Smith, M.Inst.C.E., the Chief Engineer to the Tottenham and District Gas Company, was attended with success.

The first item of the meeting comprised an inspection of the Tottenham Gas-Works, where, on the morning of May 1, the members were received by Mr. Henry Woodall, M.Inst.C.E., the Chairman and Managing Director of the Tottenham Company, and by Mr. Smith. Of late years these works have undergone almost a transformation, so rapid has been the growth in the demands for gas supplied by the Company. Consequently the visitors had much to interest them during the tour of inspection, upon the arrangements for which Mr. Smith and his staff deserve congratulation. The reconstruction work carried out recently was dealt with by the President in his Address at the business meeting in the afternoon, which was published in the "Journal" for May 1, p. 263.

Following the inspection, the members were conveyed to the Hotel Cecil, where they were entertained at luncheon by the Chairman and Directors of the Tottenham and District Gas Company. Mr. Henry Woodall presided.

After the Loyal Toast had been honoured,

Need for Further Co-operation.

The Chairman submitted the toast of "The Eastern Counties Gas Managers' Association." It was, he said, a great pleasure to himself and his co-Directors to welcome the members of the Association, and it was an equal pleasure to couple with the toast the name of their mutual friend Mr. Smith. They at Tottenham owed a great deal to the Association; but he thought that the Association, in their turn, should be indebted to Tottenham for having provided for them three Presidents. The Association, he felt, were doing useful and important work. Though they did not include in their membership the largest gas undertakings, nevertheless they did include many enterprising concerns. There was no doubt that it was an excellent thing for them to meet together and compare notes; and in this regard he suggested that gas men generally were frank and generous with one another, and that when one among them discovered something, then the industry benefited by the information. On the engineering side the combination was good, but they did not combine so well on the selling side. For instance, in regard to the sales of coke and tar, they in the Eastern district found other people trespassing on their province. Some of the products they sold had actually a greater value than appeared from the price at which they were sold. When undertakings were temporarily over-stocked, they were apt to sell at an uneconomic price. A solution to this could be found if they met together and considered the problem. Too much coke might be produced at one works, and too little at another; and if they in the Association looked after their own area—an area of 150 sq. miles—and decided to eliminate encroachment, they would do something to benefit the industry without at the same time causing injury to the consumer.

An Association of Quality.

The President expressed the thanks of the Association to Mr. Woodall and his co-Directors for inviting the members to Tottenham, and for their hospitality. Without the support and encouragement of boards of directors and of committees, observed Mr. Smith, it would be almost impossible for the Association to carry on. The gas industry, he continued, was one of great magnitude and importance. Co-operative bodies had been formed to develop the industry from within, and to put before the public the many advantages of gas and the bye-products of carbonization. These co-operative bodies were of recent birth; but before their formation gas engineers had appreciated the advantages of meeting together, and this appreciation had led to the formation of the Parent Institution and the District Associations. In connection with the Institution of Gas Engineers, the Association were proud that one of their members, and a Past-President, was now occupying the Chair of the Institution. (Applause.) The Association might not be so strong numerically as were the other District Associations; but the fact that the Eastern Counties had provided no fewer than five Presidents of the Institution showed that what the Association lacked in quantity was compensated by quality. It was, concluded Mr. Smith, highly appropriate that the toast should have been in the hands of Mr. Woodall, for, of the gas produced in the Eastern Counties, he was in some measure responsible for 6000 million c.ft. per annum.

A Well-Managed Industry.

Mr. G. Hay Morgan, K.C., B.Sc. (a Director of the Tottenham and District Gas Company), proposed the toast of "Our Guests." He had, he said, been in touch with the Eastern Counties Gas Managers' Association for many years. Long before he became connected with the gas industry, he had been associated with the late Sir Daniel Goddard, who was Chairman of the Ipswich Gas Light Company, and more recently he had been associated with Mr. Woodall, Mr. Broadberry, Mr. Smith, and Mr. Goulden. What impressed him was that, if the industry throughout the country was managed by men of this type, then it was managed by the best men in the country. The Association had chosen Mr. Smith as their President; and they at Tottenham naturally thought well of those who thought well of those of whom they thought well. The Association, however, could not appreciate Mr. Smith more fully than did they of the Board of Directors of the Tottenham Company. Among their guests, continued Mr. Morgan, was Mr. Mullaney, Vice-President of the People's Gas Light Company of Chicago, and also Vice-President of the American Gas Association. Mr. Mullaney, as they were doubtless aware, was interested in the question of differential rates for gas in America; and it would be interesting if he would say a few words on this topic.

Equity of Differential Rates.

Mr. Bernard J. Mullaney, who was greeted with enthusiasm, said that it might be alleged that he was present under false pretences, for his appearance in London had nothing to do with the gas business. He was nearing the end of a holiday, and could be regarded as a "loafer"—and certainly no "loafer" had any place in a gathering of gas men. If, continued Mr. Mullaney, he could close his ears to the slight difference of accent, he could imagine himself at a meeting of American gas men, for there was the same vitality and keen spirit. He was gratified to find that the gas industry in Great Britain was in so flourishing a condition. The gas industry in the United States was enjoying a similarly happy state of affairs. They had experienced more definite and tangible progress during the past ten to fifteen years than during any previous period—and this in spite of keen competition from electricity. One of the reasons for this marked development was the decided impetus which had been given during the past twelve years by co-operation. In America they set great store by frank, free, and comprehensive interchange of information. If one company found some new or modified process advantageous, then their information was made available cheerfully. The work of the American Gas Association was keyed and focussed on the development of new information. The question of rate-making was too complicated to discuss briefly; but he might say generally that efforts had been, and were being, made by equitable preferential rates to encourage the consumption of gas at off-peak periods of the day and at off-peak seasons of the year, so as to keep their capital investment better employed. Preferential rates had not been adopted universally, but those gas companies which had adopted them were showing the most substantial progress. Certainly it might be advisable for British gas engineers and administrators to become better acquainted with this particular subject. Concluding his remarks, Mr. Mullaney suggested that great value would accrue if there was closer personal contact between gas engineers in Britain and their confrères in America. For years he had been trying to persuade Mr. Good-enough to visit America for the annual convention of the American Gas Association; and he hoped that he might be able to accept the invitation for the meeting next year, when he (Mr. Mullaney) would, if nothing unforeseen happened, be at the head of the convention.

A Fortunate Company.

Mr. Frank Prentice (Engineer and Manager of the Ipswich Gas Light Company), proposing the toast of "The Chairman and Directors of the Tottenham District Gas Company," remarked that the Company had always been extremely fortunate in its administrators. Sir Daniel Goddard and Sir Corbett Woodall were administrators of great wisdom and foresight; and in Mr. Henry Woodall they had a man who was doing marvellous work in the gas industry. They had had a good Engineer in Mr. Broadberry, and now they had another good one in Mr. Smith. The Association were proud to have as their President such a distinguished Engineer. From the early days the Tottenham Company had shown enterprise; and enterprise led to progress, which in turn brought about prosperity. Next year, continued Mr. Prentice, Mr. Woodall would be President of the British Commercial Gas Association; and there could be no more suitable man for the position. The day had arrived when gas was faced with fierce competition, and would no longer sell itself. Their business was to put their own house in order, and leave no stone unturned to push gas to the front. Given enterprise, they need have no fear; and they had an example of such enterprise in the works of the Tottenham Company, the inspection of which had been of great educative value. He coupled with the toast the name of Mr. Henry Woodall.

Mr. Woodall briefly responded.

BUSINESS MEETING.

Thereafter the Business Meeting was held in the Hotel Cecil—the President in the Chair.

After the adoption of the minutes of the last meeting,

Presentation to Retiring President.

The President said he had the pleasant duty to perform of asking Mr. Hansford, the retiring President, to accept the customary Gold Medal to mark his year of office as President. In Mr. Hansford they had had a President of whom they were all very proud.

Mr. J. B. Hansford (Bedford), replying, said that he appreciated the honour very greatly, and the memento would be a constant reminder of a happy year of office. He thanked all

those who had played a part in making his occupancy of the Chair so enjoyable.

ELECTION OF HON. MEMBERS.

The PRESIDENT, having referred with regret to the resignation of Mr. P. J. Channon (Newport Pagnell) from membership of the Association, said he had a very interesting proposal to put before the meeting—that Mr. Henry Woodall be elected an Hon. Member of the Association. This proposal, he thought, required few words from him, for Mr. Woodall was, as they all appreciated, an engineer of wide experience and great ability.

Mr. THOMAS GLOVER (Norwich), seconding the proposition, remarked that the motion needed no commendation. He had met many able gas administrators in his time, but none wiser or more considerate than Mr. Woodall. The Association would honour itself in electing Mr. Woodall an Hon. Member.

On being put to the meeting, the resolution was carried unanimously.

The PRESIDENT then proposed the election of Mr. J. H. Brearley as an Hon. Member of the Association. Mr. Brearley, he observed, had been a member of the Association for many years, and was also a Past-President. All those present realized the value of the work he had done in the past for the Eastern Counties Gas Managers' Association, and for the gas industry generally.

Mr. GLOVER, seconding the proposition, referred to Mr. Brearley as a hard-working gas engineer who had taken a wide view of his duties, to the benefit of the whole gas industry. His contributions to the Technical Press were a source of help.

This resolution was also passed *nem. con.*

NEW MEMBERS.

On the proposition of Mr. J. W. AUCHTERLONIE (Cambridge), seconded by Mr. S. HANDS (Sleaford), the following were elected to membership of the Association: Mr. J. W. Mulley (Maldon) and Mr. J. Demain (Spalding).

The following were elected to associate membership: Messrs. C. B. Moore, S. M. Milbourne, and H. Blakeley.

ANNUAL REPORT AND BALANCE-SHEET.

The PRESIDENT proposed the adoption of the annual report and balance-sheet. In doing so he mentioned that the balance in hand amounted to £45 4s. 7d., and that the balance of the Benevolent Fund, instituted by Mr. W. Jones, of Felixstowe, was £75 8s. 4d.

Mr. H. R. WIMHURST (Bury St. Edmunds) seconded; and the resolution was passed unanimously.

The PRESIDENT then moved that a donation of £5 5s. be given to the Benevolent Fund of the Institution of Gas Engineers—which proposition, having been seconded by Mr. WIMHURST, was also carried *nem. con.*

EDUCATION SCHEME.

The HON. SECRETARY (Mr. E. F. Keable) then read a letter which the Association had received from Mr. W. H. Warren, the Hon. Secretary of the Southern Association of Gas Engineers and Managers (Eastern District); this letter being a copy of one forwarded to the Secretary of the Institution of Gas Engineers together with a report of Gas Representatives on the South-Eastern Education Committee. The letter was as follows:

I have pleasure in enclosing herewith a unanimous report presented to the Eastern Division of the above Association (*i.e.*, the Southern Association) by the Gas Representatives on the South Eastern Education Committee of the Institution of Gas Engineers.

This report was discussed by the Eastern District at their January meeting, and members present were unanimous in their agreement with the recommendations brought forward in the report. They are aware that the Education Scheme of the Institution of Gas Engineers was designed to be an Education Scheme, and not merely an Examination Scheme, and that it would be inadvisable so to alter it as to allow candidates to pass examinations without a sufficiently comprehensive knowledge of their subject.

At the same time, since the inception of the Scheme, steps have been taken to modify the rules governing membership of the Institution of Gas Engineers, and the value of the Higher Grade and Diploma Certificates in Gas Engineering in future will be that they (coupled with certain qualifications regarding training and experience) will admit candidates as members of the Institution.

In these circumstances, the members of the Eastern District of the Southern Association feel that the examination might be conducted by the Institution of Gas Engineers alone, and be so designed as properly to test a candidate's knowledge not only in gas engineering, but also in ancillary subjects. They suggest that one method by which this purpose might be attained would be by incorporating an oral test in the Higher Grade as well as in the Diploma Examination.

I am instructed to ask you to bring this matter before the Council at an early date.

Concerning the report itself, Mr. Keable said he would ask the President to epitomize it.

The PRESIDENT said that what led to the passing of the resolution by the Southern Association had been the difficulties which faced some of the candidates who wished to sit for the examinations of the Institution of Gas Engineers. The Institution stated that all candidates must gain their education in the prescribed manner; but it had been felt that latitude should be allowed, and that the Institution should be able so to frame their examinations in all subjects as to make sure that mere "cramming" on the part of the candidates would not bring success.

Mr. FRANK PRENTICE mentioned that the Eastern Counties district was an extremely scattered one, and in some cases it was practically impossible for would-be candidates for the examinations of the Institution to conform to the rules set out. Investigation of the matter had been a period of tribulation for the Chairman, the Secretary, and the Examiners in the district, as well as for the students themselves; and they were extremely grateful to the Southern Association for showing them a way out of their difficulties. Surely it should be possible for a student to gain his education practically and theoretically, and gain the necessary certificates, without all the red tape of the Institution Scheme as at present laid down. As far as Ipswich was concerned, they could not get efficient fitters; and they had taken steps to educate the youths they employed by training them. It certainly seemed a pity if, after a man had taken all the trouble to educate himself, and make himself thoroughly efficient, he could not gain a certificate simply because he did not follow the precise rules of education laid down by the Institution of Gas Engineers. He would be glad to know whether any further move had been made in other District Associations.

The HON. SECRETARY said that, as the Association's Representative, he had attended a meeting of the Education Committee in Leeds. Though no definite decision was reached, he learned that the Institution were giving the matter serious consideration, and that their contention was receiving the support of the President of the Institution.

The PRESIDENT then asked the meeting whether it was their intention to support those District Associations which were endeavouring to obtain a change on the lines suggested. If so, he would put the following resolution:

> That the Scheme should be modified in order to render possible the taking of the Institution examinations by all properly trained gas engineers and students of gas supply irrespective of the methods by which they may have obtained their technical education.

The resolution was passed unanimously.

PRESIDENTIAL ADDRESS.

At this stage in the proceedings Mr. Smith delivered his Address, which, as previously stated, will be found in the "JOURNAL" for May 1, p. 263.

VOTE OF THANKS.

Mr. P. D. WALMSLEY (Great Yarmouth), in proposing a vote of thanks to Mr. Smith for his Address, said that they in the Eastern Counties Gas Managers' Association regarded their President as a pioneer worker in the industry. They always expected something thorough from him; and in the Address, which was a masterly exposition, they had not been disappointed.

Mr. A. E. BROADBERRY seconded the vote. As a Past-President of the Association, as Mr. Smith's predecessor in office, and as a member of the Board of the Tottenham and District Company, he said he was proud of their President. All that Mr. Smith had described in his Address had received the full support of his Directors; and he was sure that the confidence which the Board reposed in him would ensure that full consideration would always be paid to any of his ideas.

The PRESIDENT, having expressed his thanks for the vote, mentioned that the Institution of Gas Engineers had decided to award the Silver Medal of the Institution to what they considered was the best paper contributed to the proceedings of any of the District Associations during the year. This would doubtless engender enthusiasm among the members.

PLACE OF NEXT MEETING.

Before the close of the meeting, the PRESIDENT announced that the next meeting of the Association would be held in London.

ANNUAL DINNER.

On the evening of May 1, the members of the Association assembled at the Hotel Cecil for the annual dinner—Mr. SMITH presiding—at which Mr. WOODALL took the opportunity of thanking the members for electing him an Hon. Member.

The Loyal Toast was duly honoured, after which

A WELL-SERVED AREA.

Mr. JOHN TERRACE, M.Inst.C.E. (President of the Institution of Gas Engineers), gave the toast of "The Tottenham and District Gas Company." Seldom, he said, had he had a pleasanter duty to perform, for twenty-seven years ago he had the good fortune to enter the services of what was at that time the Tottenham and Edmonton Gas Company, with which undertaking he spent seven of the happiest years of his life. During that period the Company's output of gas doubled, and this naturally incurred a considerable amount of reconstruction at the works. In addition to this, however, he always bore in mind the feeling of comradeship which existed between his then Chief and himself. Since he left Tottenham, the area supplied

by the Company had been greatly increased. Enfield had been taken over, and recently the district of the Waltham and Cheshunt Gas Company had been acquired. The area of the Tottenham Company had increased, but always the consumers had been exceedingly well served. The visit of the members of the Association to the Tottenham Works that morning showed them one reason for this good service; and other branches of the Company's activities were carried out in an equally good manner. The efficiency of the works reflected the greatest credit on their President, Mr. Smith, and on his predecessor, Mr. Broadberry, who was now on the Board of Directors of the Company. There were, however, those who had even more power to accelerate or retard the progress of the Company; and here again Tottenham had been well served. When he first joined the Company, Sir Corbet Woodall was Chairman; and he guided the affairs of the Company through a period of extraordinarily rapid development. It was during his tenure of office, too, that co-partnership was introduced.

Contented Workmen.

Mr. Woodall, replying to the toast, remarked that the Tottenham Company were naturally greatly interested in the Eastern Counties Gas Managers' Association if only for the reason that the Association had supplied them with such excellent officers. The Company had, indeed, been extremely well managed for many years. Mr. Terrace had referred to the co-partnership scheme. This was, of course, most useful, for it resulted in contentment on the part of the workmen, and appreciation of the fact that the Company was deserving of good service. Regarding the growth of the undertaking, this gave rise to more work, but at the same time it increased the interest of this work. Concluding his remarks, Mr. Woodall again thanked the members of the Association for electing him an Hon. Member—an honour which he valued highly.

Tottenham and the "B.C.G.A."

Mr. A. E. Broadberry, in proposing the toast of "Our Guests," mentioned that he had been associated with the Eastern Counties Gas Managers' Association for very many years. He supposed that the reason why he had been asked to submit this popular toast was because he was a Past-President of the Association, and also because he was the predecessor of Mr. Smith at Tottenham. His position was, however, somewhat difficult in that, as a Director of the Company, he was one of the Association's guests. Moreover, the position was no less involved by the fact that Mr. Woodall, when he (the speaker) was first asked to propose the toast, was a visitor, while now he was a member of the Association. (Laughter.) They were honoured by the presence of Mr. Hay Morgan, who, as they were aware, was a Director of the Tottenham Company, and of Mr. Terrace, the President of the Institution of Gas Engineers, who had already told them of the happy time they had spent together at Tottenham. The support of Mr. Terrace in those days was one of the finest things that anyone could ever experience. They had also with them Mr. Dean, President of the Southern Association, who commenced his career with the Tottenham Gas Company. Thus the Company had provided three reigning Presidents in Mr. Terrace, Mr. Dean, and Mr. Smith. Then there was present Mr. Goodenough. He could not claim that Mr. Goodenough was connected with Tottenham, but Tottenham could claim to be connected with Mr. Goodenough. The commencement of the British Commercial Gas Association could be traced to the suggestion that the Institution of Gas Engineers should form a publicity committee; and he (the speaker) had had the privilege of suggesting to the Board of the Tottenham Company that, if twenty supporting undertakings could be found, then they should subscribe 2s. 6d. per million c.ft. of gas sold to the funds of the "B.C.G.A." This was found possible, and it was the basis on which Mr. Goodenough had organized the Association.

Mr. F. W. Goodenough, C.B.E., Chairman of the Executive of the British Commercial Gas Association, responding to the toast, said that it was a great pleasure for him to be present, for, while, as Mr. Broadberry had remarked, he was not an old Tottenham man, he had been closely related to the undertaking. Tottenham was the first Company to subscribe to the funds of the "B.C.G.A.," and he could not say how much the Association owed in its early days to the warm support of Sir Corbet Woodall, who at that time was a Director of the Tottenham Company and also of the Gas Light and Coke Company. It was on May 1, 1903—exactly twenty-six years ago—that the Directors of the Gas Light and Coke Company passed a resolution to the effect that a new department should be formed to develop sales. He (Mr. Goodenough) was placed in charge of this department, which was inaugurated on the personal responsibility of Sir Corbet, whom he regarded as his foster-father in the gas industry. Sir Corbet was the first President of the "B.C.G.A." He was a man of extraordinary foresight, keenness, and energy, and was gifted with that power of appreciating and encouraging young men which was the greatest sign of a leader of men. Not only was Tottenham the first Company to subscribe to the "B.C.G.A.," but the then Engineer, Mr. Broadberry, was one of the members of the first Executive Committee; and he (the speaker) had always found in him a keen and enthusiastic member of the Executive, and one to whom he, as Chairman, owed a very great deal. Mr. Goodenough concluded his remarks by expressing his gratification at the presence of Mr. Terrace, who, he said, was one of the keenest Presidents that had ever occupied the Chair of the Institution. The work he had done in connection with education was alone sufficient to mark him as one of the most active Presidents that the Institution had had for many a long day.

Mr. W. E. Dean, President of the Southern Association of Gas Engineers and Managers, in proposing the toast of the "Eastern Counties Gas Managers' Association," said that, if Mr. Smith made as good a President of the Association as he had made a Secretary of the Southern Association, then he could congratulate the members of the Eastern Association on their choice.

Mr. A. Gregory, Vice-President of the Eastern Counties Association, responded.

The final toast of the evening was that of "The President," which was submitted by Mr. Auchterlonie. In his reply, the President said that any success which had attended the meeting was due largely to the kind spirit of the Chairman and Directors of the Tottenham Company, and to the work of the staff.

VISIT TO WATSON HOUSE.

On Thursday afternoon, May 2, the Association were the guests of the Gas Light and Coke Company in a tour of inspection of Watson House.

Conveyed from Grosvenor Gardens by motor coaches, the visitors were met at Watson House by Mr. J. G. Clark, of the Research and Training Section, and taken in parties over the premises. The first department inspected was the apprentices' shop, where boys from the age of fourteen are trained in gas-fitting practice. There is no revenue obtained from this shop, as all the work done is practice for the boys only. Then the carpenters' and polishing and lacquering shops were inspected, followed by the geyser testing room. Here there are numerous types of geyser in section, and parties of a dozen or so fitters from the districts come up every day for "refresher" courses, or for the study of new apparatus. A new type of baffle which is being experimented with by the Company was shown. In regard to the apprentices, the Company take on about a hundred boys a year, though the actual retirement and death rate of their staff is slightly in excess of this number. It was pointed out, however, that at this time it is becoming increasingly difficult to obtain boys at the age of fourteen, owing to the decreased birth-rate during the war.

The visitors were shown over the fitters' training shop, where all ranges of cookers and fires are thoroughly mastered, as regards minor adjustments, and where meter fitting is also learnt. A new design of fitters' handcart was seen here, which was built to conform with police regulations. It is interesting to note that each year the Turners Association offer a silver medal for the best piece of work done by apprentice fitters from various firms. The Gas Light and Coke Company have won this medal on several occasions, and the winning piece of work was to be seen. The lecture room was next inspected, and here the apprentices attend classes one half-day each week. Here was seen a projector by which the thread of pipes is tested, and much interest was evinced in a new form of gas plug for irons or portable rings, whereby the insertion of the plug in a socket automatically turns on the gas, and withdrawal turns it out again.

The research laboratory was then inspected, where tests for radiant heat are made on different types of gas fire. There was also to be seen a new design of portable heater, a gas poker, and the unit of an "Electrolux" refrigerator. Experiments are in progress relative to increasing the efficiency of the "Sunhot" boiler. Another apparatus that attracted the visitors' attention was a small heating appliance for linen cupboards. It has been found by the Company that prospective customers are deterred from having a geyser installed on account of their having to dispense with their hot linen cupboard. With this appliance the difficulty has now been overcome, and with the small consumption of about 4 c.ft. per hour the linen cupboard can be kept hot without any danger of the clothes coming in contact with the flame, this being completely enclosed.

Different designs of pneumatic switch for distance control of lights were to be seen, and the Association finally inspected the chemical laboratory. Here were seen photographs of the inside of burner injector tubes in section, and inaccuracies in the boring were plainly visible in some. Various manufacturers send up their work to be tested for faults in the boring, as these often cause roaring in the lighting burner. Here was also viewed an apparatus for testing mantles for shocks, together with an apparatus for detecting down to one part in a million of carbon monoxide in the air. In this connection it was stated that by breathing over the top of a gas geyser less carbon monoxide would be inhaled than in the street outside the Bank of England; and less from a gas fire than in the Blackwall Tunnel, though steps are being taken to remedy the high figure of carbon monoxide in this latter place.

After the inspection, the visitors were entertained at tea by the Directors of the Gas Light and Coke Company. Mr. Henry Woodall, the Deputy-Governor, presided, and was supported by Mr. R. W. Foot (General Manager), Mr. Stephen Lacey, and Mr. W. McDowall.

Vote of Thanks.

The President proposed a hearty vote of thanks to the Gas Light and Coke Company for the enjoyable visit which the Association had made that afternoon. It had, he said, opened their eyes to the very valuable work the Company were doing for the benefit of the whole industry. Such a visit as this was typical of the co-operation that existed in the industry to-day.

Mr. Woodall, replying, apologized for the absence of the Governor, Sir David Milne-Watson, on that occasion, and extended a hearty welcome to the Association. He pointed out that he himself was there in double capacity—in the first place as one of them, and also as host. Watson House would perpetuate the name of their Governor for many generations, besides being typical of the useful work being done in the industry to-day.

SOCIETY OF BRITISH GAS INDUSTRIES.

Annual General Meeting.

The Annual General Meeting of the Society, which was held on Tuesday of last week, April 30, at the Hotel Metropole, Northumberland Avenue, London, W.C., was a successful gathering. It was held under the Presidency of the Most Hon. the MARQUESS OF HARTINGTON, M.P., whose address was published on pp. 255-57 of last week's "JOURNAL." The annual dinner took place in the evening, when some interesting speeches were made. The new President of the Society is the Rt. Hon. Viscount Cecil of Chelwood.

On the opening of the business proceedings, the minutes of the last annual meeting and of the autumn meeting were taken as read and confirmed.

REPORT OF THE COUNCIL FOR 1928-29.

Mr. R. J. MILBOURNE (Chairman of the Council) then submitted the following report upon the work of the Society during the year 1928-29.

We have to record with much regret the death of the following members:

John E. Williams, Chairman, John E. Williams & Co., Ltd., and one of the founders of the Society.

Frederick G. Cockey, Director, Smith Meters, Ltd.

Henry S. Smith-Rewse, Vice-Chairman, Whessoe Foundry and Engineering Co., Ltd.

Sidney Hersey, Director, Kirkham, Hulett, & Chandler, Ltd.

William Perrott, Chairman, C. & W. Walker, Ltd.

J. T. Daly, Managing Director, The Horseley Bridge and Engineering Co., Ltd.

also

Arthur F. Bezant, Editor of the "GAS JOURNAL."
Peter Robertson, Editor of the "Gas World."

The Society wishes to offer hearty congratulations to The Right Hon. Lord Melchett, one of our Past-Presidents, on the honour of a Peerage conferred upon him by His Majesty the King.

Economic Commission to Australia.—It was with much gratification we learnt that His Majesty's Government had appointed Sir Arthur Duckham, K.C.B., Leader of the Economic Mission to Australia; it was a great compliment to him and to the gas industry. We congratulate him on his safe return and the success of the Mission, and hope that the conferences with the producers and industrial leaders in Australia will result in a great increase of trade with Great Britain.

Gas Developments.—Dr. E. W. Smith has been appointed Chief Technical Officer of the Area Gas Supply Committee of the Board of Trade, which is carrying out an investigation spread over the industrial areas between Liverpool and the Humber, and Leeds and Birmingham, to see if gas undertakings in that area can take a supply of gas from the coke ovens which already exist there, or may be erected in future. We take the opportunity of congratulating him and wishing him every success.

Leeds University.—At the laying of the Foundation Stone in October of the new buildings of Leeds University by Her Grace the Duchess of Devonshire, we were represented by our Vice-Chairman, Mr. C. A. Goodall.

World Power Conference—Fuel Conference.—The Society, as one of the constituent bodies of the World Power Conference, British National Committee, views with satisfaction the large measure of success attained during the meetings held at the Imperial Institute, London, from Sept. 24 to Oct. 6. Many of our members attended, and your Council is of the opinion that the Organizers are to be congratulated on the results achieved. The Chairman of the Council for the time being has been appointed our representative on the British National Committee of the World Power Conference.

International Conference on Bituminous Coal.—Dr. E. W. Smith acted as our delegate at the Conference at Pittsburgh, U.S.A., and has presented an interesting report.

British Industries Fair, Birmingham, 1929.—The Gas Industries Section at the Fair organized by the Society with the co-operation of the Institution of Gas Engineers, the British Commercial Gas Association, and the National Gas Council was a pronounced success, as evinced by the wide publicity in the national Press. The Central Information Bureau received a good deal of attention, served a very useful purpose, and fully justified the expense incurred in its design and equipment. It was favourably commented upon in the Press and by visitors to the Fair. We are much indebted to the Birmingham Corporation Gas Department for the energetic work they put into the organization of the Section, to the Joint Committee, and to Mr. R. J. Rogers who again so ably acted as Hon. Secretary. The Joint Gas Conference during the run of the Fair was well attended, and we desire to express our thanks to those who kindly contributed papers. The Council has decided again to undertake the organization of the Gas Industries Section at the Fair next year, and hopes for the co-operation of the other organizations in the Industry.

Bills in Parliament.—Our Parliamentary Agents have watched Bills likely to affect our members; and we are pleased to report that the Society has derived considerable benefit from their efforts on our behalf.

British Engineering Standards Association.—This Association, which has recently applied for a Royal Charter, has intimated its intention of giving representation to both sides of the gas industry—namely, the Institution of Gas Engineers and the Society, to be named "The Gas Industries Sectional Committee." We have accordingly nominated four representatives on the Committee. The draft British Standard Specification for Tars (Nos. 1 and 2) for Road Purposes has been under consideration, and, on the invitation of the Association, Dr. E. W. Smith has been appointed our representative on the panel which is engaged in the preparation of the specification.

Standard Conditions of Contract.—The revision of the Standard Conditions has been under consideration, and it is hoped shortly to arrange a conference with a committee of the Institution of Gas Engineers to discuss the suggested alterations.

Gasholders.—During the past year, Mr. R. J. Milbourne has read two very important papers on this subject, one before the Society of British Gas Industries, dealing particularly with the corrosion of gasholder sheeting, and which is published, together with the discussion on same, in the Society's Bulletin No. 26 dated December, 1928. His other paper on gasholders was read before the Joint Gas Conference at the British Industries Fair, Birmingham, on Feb. 19, which not only generally dealt with guide-framed and spiral gasholders, but also included a description of the new type of spherical high-pressure gasholder, and also the tankless gasholders on the M.A.N. and Klönne systems. This paper was published in the "GAS JOURNAL" on Feb. 20, and the discussion on same appears in the "GAS JOURNAL" of Feb. 27. These two papers form a very valuable contribution to the general subject of gasholder construction.

Gas Stove Section.—During the year there have been four meetings of Section VI., at which various subjects of vital interest to all the members have been brought forward, carefully discussed, and important recommendations made, and decisions arrived at.

International Commission on Illumination.—Mr. H. Talbot, late Chairman of the Lighting Section, was nominated to represent the Society at the meetings in New York in September, but unfortunately owing to unforeseen circumstances was unable to go out. Mr. Robert Watson, of Doncaster, who represented the Institution of Gas Engineers, with the consent of the Institution kindly represented us as well, and the very hearty thanks of the Society have been conveyed to him for his services.

British National Illumination Committee.—Col. E. A. Wilson, Chairman of the Lighting Section, has been appointed as one of our representatives on the Committee in place of Mr. H. Talbot resigned. Mr. Philip H. Sugg has been appointed our representative on the following Sub-Committees:

Factory Office and School Lighting.
Diffusing Materials.
Light Flux Distribution.

Illuminating Engineering Society.—To show our interest in the work of the Illuminating Engineering Society, we have recently become "Sustaining Members," and have given financial support. Mr. Frederick J. Gould has been appointed as our representative.

Public Lighting Engineers' Conference.—At the Annual Conference at Sheffield of the Public Lighting Engineers in July, the gas industry was very well represented. Some of our members loaned for inspection street lighting installations conforming to the British Standard Specification for Street Lighting, which was recently issued, and the tests were very satisfactory.

Lighting Load.—Efforts are in progress to stimulate increased interest in the use of gas for lighting, and active steps are being taken in this direction. A Sub-Committee has been in conference with a Committee appointed by the British Commercial Association, and has discussed the matter.

Refractories.—Progress in refractory research and manufacture during the past year has been great and continuous. Mr. Frank West has been elected Vice-Chairman of the British Refractories Research Association, an organization with which he has been very actively concerned for some years past. Mr. W. J. Gardner, a Member of the Society under Section X., is the President for the year of the Ceramic Society, and in April is leaving with a party for America, in which Section X. is strongly represented, for an intensive tour of the Eastern Firebrick Works.

Gas Coal Section.—During the past twelve months, two or three meetings have been held, when the various schemes brought forward by the coal owners to try to improve the deplorable condition of the coal industry were carefully considered. It is generally agreed that an economic price must be obtained to give a fair return to the colliery shareholders, and provide the workers with a decent standard of living. At the same time, it was felt that great care must be exercised in the fixing of restricted production, as the creation of an artificial shortage of coal would in the long run be beneficial neither to the country nor to the coal industry itself. The gas industry is naturally vitally interested in these questions, and the general view seems to be that, while unnecessary inflation of prices would be

strongly opposed, there would be no objection to a reasonably fair economic price being paid for gas coal, if proper and regular future supplies are to be available.

Revision of Railway Classification of Goods.—Messrs. Tweedy & Holt, our railway experts at Halifax, continue to watch our interests, and their reports keep us in touch with railway matters. The prizes in the City and Guilds of London Institute Examinations in Gas-Works Practice, Gas Supply Practice, and Gas Fitting have been duly awarded, and announced in the Technical Press. The membership of the Society is steadily increasing. Six new firms have joined during the period under review.

The Society wishes to accord their best thanks to the Most Hon. the Marquess of Hartington, M.P., for his valuable services during his Presidency. On his retirement he has been pleased to accept the office of a Vice-President, and we hope that we may long have the benefit of his counsel and advice. We also desire to place on record our best thanks to His Grace the Duke of Sutherland for his able and valuable presidential address at the last Annual Meeting, which dealt with the national position in regard to fuel, especially with reference to the oil and coal industries and the importance of co-operation between the gas industry and the coal industry; also to Mr. R. J. Milbourne, J.P., A.M.Inst.C.E., Chairman of the Council, for his Paper at the Autumn Meeting on "Gasholder Sheeting," which led to a good discussion.

We have much pleasure in announcing that the Right Hon. Viscount Cecil of Chelwood has accepted the Presidency of the Society for the coming year.

On behalf of the Council,
R. J. MILBOURNE,
Chairman.

Remarks by the Chairman.

Mr. Milbourne said: Before moving the adoption of the report, I should like to make a few personal remarks. In the first place, I have to refer with much regret to the death of several members of our Society. I am quite sure it will be the wish of all of you that we should mark our respect by standing silently. [This the members did.] I may say that the report this year has been compiled from information furnished by the Chairmen of the various Sections. I venture to think that the record of the past year's usefulness is highly satisfactory, and shows how our Society has developed in work of value, not only to our members, but to the industry of which the operations of the members form part; and the results achieved should be the means of inspiring the members to expand still further its serviceability for the prosperity of the gas industry generally.

An enormous amount of prominence has been given to the theoretical merits of electricity; and so much has been heard about the centralization of electricity supply and the benefits likely to accrue therefrom, that in many circles it has become accepted as a matter of course that centralization is the sure road to cheap electricity. Some enthusiastic supporters have already been talking about electricity supply in rural districts at one farthing per unit; and although the relative costs of production in large and small stations do not support this over-optimistic outlook, it shows conclusively that the gas industry must not be lacking in enthusiasm and progress, and be fully prepared to deal with the severe competition we shall have to face. It is, however, very gratifying to note the steady progress which the gas industry continues to make, in spite of all competition. Substantial increases in gas consumption continue to take place all over the country for cooking, heating, and lighting. These increases in gas consumption have necessitated the placing of contracts with our members for the erection of new plant in many localities, and for the alterations and extensions of existing plant. This is evidence of the healthy condition of the industry, notwithstanding the many disadvantages of obsolete legislation under which it is compelled to conduct its business.

It is very pleasing to note that our Society has decided to continue its support to the Gas Section for the next British Industries Fair at Birmingham in 1930; and I trust that those of our members who exhibited at the last Fair were rewarded by a material increase in the sale of their products, and are fully satisfied with the results obtained from their participation in the Gas Industries Section. But the gain to the gas industry from this co-operative effort is much more far-reaching than the satisfactory trading results recorded by the individual exhibitors, as it materially assists in keeping the progressive character of the industry alive in an atmosphere where every possible opportunity is taken by our electrical competitors to exhibit and explain their latest appliances. Although it is very difficult to gauge the actual amount of business transacted at the Fair, there is no doubt that this was considerable, and that even from this limited point of view the great majority of exhibitors were well satisfied. This Society is more concerned with the broader view of the benefit which accrues to the gas industry as a whole from its organized representation at this National Fair. Although, owing to the abnormally severe weather both here and on the Continent, and the general prevalence of illness throughout the country, the numbers of buyers and of the general public were not so great as last year, yet the publicity which the industry obtained both at the Fair and in the general newspapers of the country was most satisfactory. At the present time anything of the nature of national publicity for the industry is of the greatest importance to it; and all who recognize how vital is the need for educating the public in the uses of gas will realize how wide an influence the Gas Industries Section must have in widening both the industrial and domestic uses of gas. Exhibitors in the Section are to be congratulated on the great care they took to have their stands staffed by responsible representatives. In many instances directors and proprietors were in personal attendance throughout the Fair period. We must endeavour to make the Gas Industries Section at the 1930 Fair worthy of the gas industry and the Society of British Gas Industries.

While we are congratulating ourselves, we must not be unmindful of the powerful aid rendered to our industry by the "Kindred Gas Associations." We gratefully acknowledge the very useful work carried out by the National Gas Council, under the able Presidency of Sir David Milne-Watson, whose efforts to secure appropriate legislation for the removal of unnecessary restrictions on the gas industry will, I feel sure, be ultimately crowned with success. I am pleased to report that the third and final reading of the new Gas Bill took place on April 29 in the House of Commons. Though this Bill is somewhat limited, it is very acceptable. We are looking forward to the introduction of a much broader Bill in the next Parliament. The most pressing concessions the gas industry is urgently in need of, for its further development, are powers to charge consumers by other than the flat rate, as the electricity industry does; increased facilities and powers in connection with works co-operation and joint working; greater freedom and facilities for raising capital; and an amendment of the Gas Regulation Act, 1920.

We are also indebted to the Institution of Gas Engineers for organizing the Joint Gas Conference at the British Industries Fair, which was brought about by the foresight and initiative of the President, Mr. John Terrace, M.Inst.C.E.; and I would express the fervent hope that a similar conference will be arranged for the coming year, for I feel sure that there is a strong spirit of appreciation throughout the gas industry of the value of co-operation, and a desire to work for one common end. All exhibitors were unanimous that the Joint Gas Conference proved a most valuable means of increasing the attendance of gas engineers and buyers at the Fair; and, indeed, some exhibitors, in applying for their space for next year's Fair, have made their application contingent upon there being some kind of Gas Conference held during the run of the Fair.

The British Commercial Gas Association in particular are doing an immense amount of publicity work, which materially assists the trade and prosperity of our members. It is the business of the "B.C.G.A." to make the public conscious of the service which gas is capable of rendering, and they can be relied upon to carry out this work effectively, if they are supplied with ample funds. It is extremely gratifying to note that the very newest and most up-to-date garden suburb of London, where nearly 6000 houses have been built, has adopted the use of gas throughout, not only for cooking and heating purposes, but also for lighting. In addition, the schools and streets are gas lighted; 31,000 burners being used for the purpose.

I should also like to extend a meed of praise to the very useful work accomplished by the Gas Salesmen's Circles. It indicates that this latest addition to our kindred organizations is anxious to improve the technique of its members, and extend the sale of gas appliances, and consequently increase the amount of gas consumed. These Salesmen's Circles are worthy of every encouragement and support; and I am, therefore, very pleased to announce that the council of the Society have decided to offer a gold medal to be awarded each year to the writer of the best paper read before the Circles during the year.

I now beg to move the adoption of the Council's report.

The Coal Section.

Mr. C. A. Goodall, in seconding the adoption of the report, remarked that, as would have been gathered from what the Chairman had said, the relationships between the Society and the other organizations of the industry had been as friendly as in the past. They had all been working together with the common object of doing the best possible for the industry. Reference was made in the report to the recent World Power Conference, in which several members of the Society took part. In considering the subject of gas, they must get down to the very foundation, which was coal; and papers read at the Conference dealt with various aspects of the provision for gas-works of such raw material as would enable them to produce gas at the cheapest possible rate. This, of course, had close connection with the Coal Section of the Society. Although this Section was not very old, much work had been done by it which would be of benefit to the gas industry. The question of the lighting load was mentioned a year ago, and the suggestion which was thrown out that the "B.C.G.A." might do something more in regard to this particular part of their activities had been received by them in the friendly spirit in which it was made. A recent issue of "A Thousand-and-One Uses for Gas" was devoted solely to street lighting by gas.

Gold Medal for Salesmen's Circles.

Mr. Charles Clare asked whether the gold medal for the best paper would refer to one particular Circle, or whether it would be for the best paper read before any Circle.

Mr. Milbourne replied that it was intended to apply to the

Circles throughout the country. He understood that the Institution of Gas Engineers had now decided that their gold medal should be given for the best paper read before the Institution, the silver medal for the best District Association paper, and the bronze medal for the best Junior Association paper. This left out the Gas Salesmen's Circles, who were deserving of all possible encouragement. That was why the Society were bringing forward their suggestion. There had not yet been time to work out the details.

The report was then unanimously adopted.

The Accounts.

Dr. E. W. Smith (Hon. Treasurer) then submitted the accounts for the past year, remarking that there had been increased expenditure causing an actual loss on the year of £45. This was accounted for by the various activities of a fresh nature which had been entered into during the year. In connection with the Gas Section of the British Industries Fair, there was an item of £50 which was on account of the previous year. The present accounts did not show the details of the special fund which was agreed to at the last annual meeting. It would be remembered that the members of the Society had been in the past annually asked to subscribe as individuals to the "B.C.G.A.," and a fund was created, which was handed over as a whole to the Association. A year ago it was agreed unanimously by the Council—and, so far as could be gathered, unanimously by the meeting—that a special fund should be created to cover the activities of the Society in every direction, and that there should be an advance in these activities. From that fund there was to be a subscription to the "B.C.G.A." A quite substantial fund was now in existence; but it was not advisable at this stage to indicate the manner in which it was being dealt with, beyond saying that the subscription to the "B.C.G.A." of past years had been maintained. It was necessary that a larger number of the members should appreciate what the fund was for, and those who had any doubt as to the uses to which it was to be put should communicate with the Council, and not allow things to go by default. There had been a good response, but they anticipated a greater one. Just the extent to which the members subscribed to this fund, would be the extent to which the Society could take its proper place in the industry, and so increase its usefulness and power. If their share in the industry's activities was not as great as some of them felt it ought to be, this was because they were not able to assess this share in terms of finance.

Mr. E. J. Fox seconded the adoption of the accounts, which were agreed to.

Council Representatives of Sections.

The President announced that the following gentlemen had been elected to serve on the Council as the representatives of the Sections:

Mr. G. J. Jackson . . . . . to represent Section	I.
Mr. J. Winson Scott . . . . . ,, ,, ,,	II.
Mr. Ernest West, M.I.Mech.E. . . . . ,, ,, ,,	III.
Mr. Samuel Cutler, A.M.Inst.C.E. M.I.Mech.E. . . . . ,, ,, ,,	IV.
Mr. Franklin Thorp . . . . . ,, ,, ,,	V.
Mr. D. MacCallum Gibb . . . . . ,, ,, ,,	VI.
Col. E. A. Wilson . . . . . ,, ,, ,,	VII.
Mr. George Ewart . . . . . ,, ,, ,,	VIII.
Mr. A. B. Balmford . . . . . ,, ,, ,,	IX.
Mr. C. R. F. Threlfall . . . . . ,, ,, ,,	X.
Alderman George Clark, J.P., M.I.Mech.E. . . . . ,, ,, ,,	XI.
Major Richard Miles, B.Sc. . . . . ,, ,, ,,	XII.
Mr. B. B. Waller, A.M.Inst.C.E. . . . . ,, ,, ,,	XIII.
Mr. Rae P. Normand . . . . . ,, ,, ,,	XIV.
Mr. E. J. Fox, M.I.Mech.E. . . . . ,, ,, ,,	XV.

New Chairman and Vice-Chairman of Council.

Mr. Milbourne, proposing the election of Mr. C. A. Goodall as Chairman of the Council, said that he had served as Vice-Chairman during the past year, and in that time had rendered conspicuous service to the Society. No member was better fitted than Mr. Goodall for the position of Chairman.

Mr. R. B. Hodgson, who seconded, said he had known Mr. Goodall for some considerable time, and had always recognized him as being a man possessed of a good deal of genius for business. He would bring to bear upon the office of Chairman judgment, wisdom, and discretion which would help the Society.

The proposal was passed with acclamation, and acknowledged by Mr. Goodall.

Mr. J. Winson Scott proposed the election of Mr. Frank West as Vice-Chairman. The West family, he said, was known to everyone present; and he was sure that they could expect the very best from Mr. Frank West.

Mr. F. C. Tilley seconded the motion.

The President said that this particular appointment gave him very great pleasure, because of all the members of the Society Mr. Frank West was the one he knew best. He was a near neighbour, a close personal friend, a Masonic brother, and a loyal and enthusiastic supporter in his (the speaker's) constituency.

The proposition was heartily agreed to.

Other Officers.

Mr. E. J. Fox, moving the re-election as Hon. Treasurer of Dr. E. W. Smith, F.I.C., said those who served with him on the Council deeply appreciated the enthusiasm and keenness which he showed on all matters that came before him. Dr. Smith had briefly touched on a matter which the Council had asked him to develop—that was, the enlargement of the scope of the Society. Those who had had the opportunity of analyzing his proposals were filled with admiration of the manner in which he had tackled the subject.

Mr. H. G. Donkin seconded the motion, which was carried.

Proposed by Mr. Goodall, and seconded by Col. E. A. Wilson, Mr. E. J. Davison, M.I.Mech.E., was re-appointed Hon. Secretary.

Mr. Frederick J. Gould moved, Mr. E. J. Davison seconded, and it was agreed, that Mr. R. J. Milbourne, J.P., Assoc.M.Inst.C.E., and Mr. Frederick C. Tilley, M.I.Mech.E., be appointed as elective members of the Council.

Moved by Mr. B. B. Waller, and seconded by Mr. Clare, Messrs. F. J. Gould, R. B. Hodgson, M.I.Mech.E., and H. M. Thornton, J.P., Assoc.M.Inst.C.E., M.I.Mech.E., were re-appointed elective members of the Council.

The re-election of Messrs. Cash, Stone, & Co. as Auditors was agreed to, on the proposition of Dr. E. W. Smith, seconded by Mr. Waller.

Mr. Clare, proposing a vote of thanks to the Council for their services during the past year, remarked that the work was increasing, and the report just submitted showed that much time and trouble had been put into it.

Mr. T. F. C. Potterton seconded this, and it was heartily passed.

Mr. Milbourne proposed, Mr. Goodall seconded, and the meeting unanimously passed, a vote of thanks to the Hon. Treasurer, the Hon. Secretary, and the Secretary for their services.

Presidential Address.

The Marquess of Hartington then delivered his Presidential Address, which was published on pp. 255-7 of last week's "Journal."

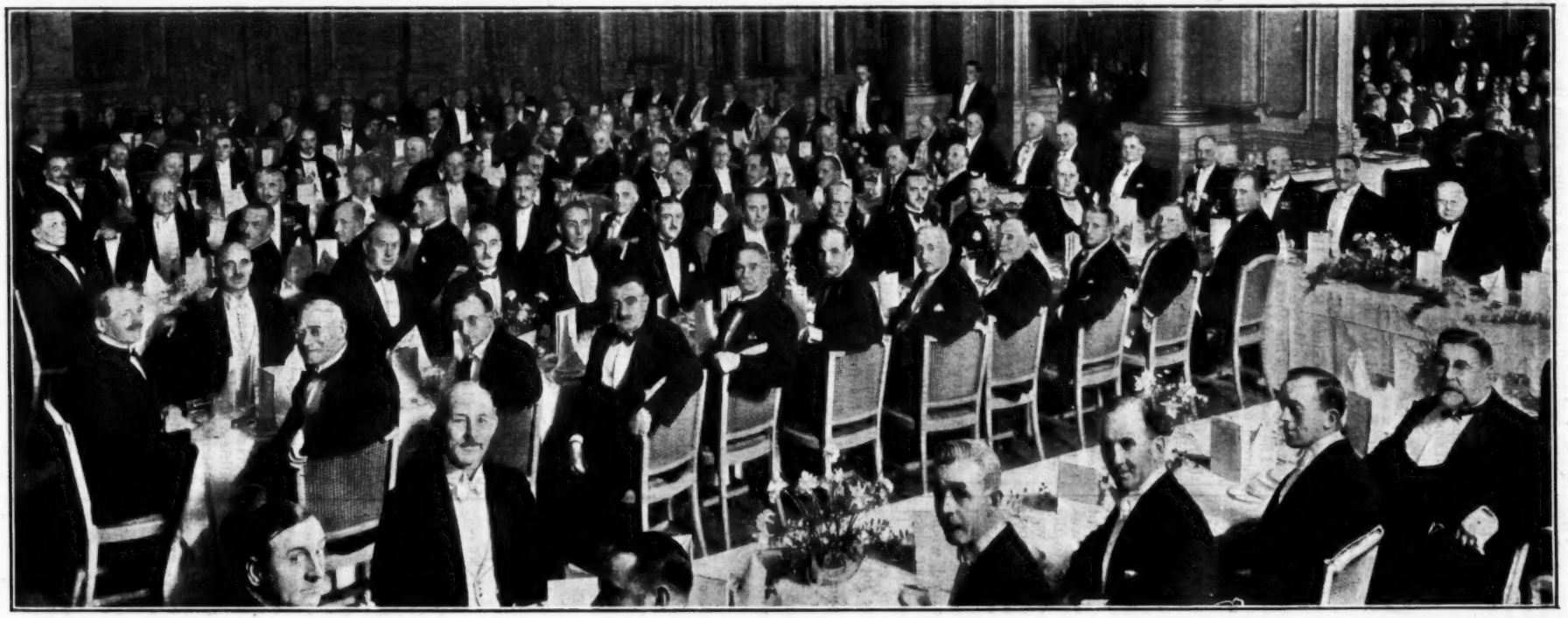
Sir Arthur Duckham, proposing a vote of thanks to the President for his address and for his services to the Society, said that interesting points with regard to the handling of coal had been raised, and the members had been shown that there were many problems yet to be studied, and many possibilities to be developed. At the conclusion of the address, the President had put his finger on a very dangerous suggestion that was being made—that low-temperature carbonization was to be the saving of the coal business of this country. ["Hear, hear."] Undoubtedly there were many collieries which had large quantities of slacks of which they wanted to make use, and the low-temperature carbonization process might be a way of helping them. Pulverized fuel was another way; and, provided the slacks were clean, coke ovens constituted a third method. It was an amazing thing that the gas industry did not insist upon having clean coal. The presence of avoidable ash was an absolute waste; and if it were removed at its source, transport was saved, the treatment of the fuel was easier, and the resultant coke was improved. This was a matter which had not received from the gas industry the attention it deserved.

Study Tar.

Another question was tar. They must all agree that they did not know sufficient about tar. There was a great deal more to be learned about it. The cracking process had not yet been properly tackled. The uses of tar acids were being developed in America, and promised exceedingly well. There should be in the gas industry a study of the possible developments of tar, which would become a very valuable item on the right side of the balance-sheet. They must seek the best possible returns for their bye-products, in order that they might sell gas at the cheapest practicable price to the community.

Low-Temperature Carbonization.

Mr. Milbourne, in seconding the vote of thanks, remarked that the address had dealt mainly with a subject of great importance at the present time—namely, low-temperature carbonization—the development of which would be carefully followed by all gas engineers, and the success of which might well have far-reaching consequences as concerning the gas industry. Coal was first commercially carbonized at low temperature, and now special attention was again being actively turned to the possibilities of this particular method of dealing with the raw material of the industry, and a large amount of money had already been spent in an effort to discover the advantages and possibilities of low-temperature carbonization. There were, however, many divergent opinions as to the future of this method of coal treatment; and he did not think that its most staunch supporters considered it would entirely replace high-temperature carbonizing practice. Low-temperature carbonization, no doubt, had its advantages in certain favourable situations; but it also had its limitations, and its success could only be achieved when the proper process was installed, where the conditions of the situation justified its adoption. It had already been stated by the Secretary of Mines that the only hope that the Government had in the coal industry was the successful introduction of low-temperature carbonization. It was therefore extremely gratifying to note that the two largest London Gas



THE "S.B.G.I." DINNER AT THE METROPOLE.

Companies had now installed low-temperature carbonization plants, and they might rest assured that the process would be thoroughly tried and tested. It was possible that at no very distant date this process of carbonization would be an important factor in the analysis of the country's consumption of both coal and gas. As to when this condition was reached would depend not so much on the technology or perfecting of the process (which appeared now to be fairly well understood) as upon the extent to which markets could be secured and developed for the smokeless fuel and the various bye-products of low-temperature carbonization. But even if they assumed that low-temperature carbonization would eventually fulfil the Government's expectations, and the process was so developed as to be a financial success, it would be the gas industry which would have to carry it out and deal with the business. He was in full agreement with the President in his concluding remarks, that however successful low-temperature carbonization might become, it would not offer any short cut to a solution of the difficulties which have beset the coal mining industry in the past. It was to be regretted that there was no indication of a wholesale recovery in the world's demand for coal such as would restore the industry to its former prosperity. There was every indication that the consumption of coal would remain at a more or less stationary level for some years to come, owing to the increasing use of water power and rival fuels, and the conspicuous success achieved by gas engineers, and others, in making a ton of coal serve where formerly a ton and a half were required. In the course of time, the natural increases in demand would overtake the evolutionary reductions, but there might well be a few years of depression in the coal mining industry, unless entirely fresh markets and other sources of revenue could be found.

The PRESIDENT said he had felt it to be a great honour as well as a great pleasure to be associated with the Society during the past year. His period of office was now over, and all that remained for him to do was to induct his successor. The Society had been very fortunate in securing as their President for the coming year Lord Cecil, who had served his country in many ways. This was perhaps in some respects a new way; but at the end of his Presidency the members would have every reason to be profoundly thankful that he had consented to accept the position. [Applause.]

Viscount CECIL OF CHELWOOD thanked the members warmly for the honour they had done him, and assured them that his services would always be at the disposal of the Society to the limit of his powers.

PRESENTATION TO THE SECRETARY.

Mr. MILBOURNE remarked that he had now a very pleasant duty to perform. Last month it became known to the Council that their respected Secretary, Mr. Griffith, had increased his responsibilities by taking unto himself a wife. The present and past members of the Council thought this would be a fitting occasion on which to mark the esteem in which he was held by those who had had the pleasure of serving with him; but the choice of a wedding present was difficult, so it had been decided to hand him a cheque for the amount which had been sub-

scribed. In asking Mr. Griffith to accept this, he wished him, on behalf of the members of the Council and all connected with the Society, much happiness in his married life. ["Hear, hear."]

Mr. ARTHUR L. GRIFFITH, in returning thanks, said it was extremely gratifying that so many members should have shown a desire to mark in this handsome manner their appreciation of his services. It was always a pleasure to work for the Society, whom he had served for so many years.

ANNUAL DINNER.

In the evening the members, along with many guests, met again in the Hotel Metropole, where the annual dinner of the Society took place. The PRESIDENT (the Marquess of Hartington) was in the chair; and among those seated at the top table were:

Lord Cecil of Chelwood, Sir Arthur Duckham, K.C.B., Mr. R. J. Milbourne, Mr. Charles A. Goodall, Prof. Arthur Smithells, C.M.G., Col. R. S. Williamson, D.L., Mr. Frank H. Jones, Prof. John W. Cobb, C.B.E., Mr. F. W. Goodenough, C.B.E., Dr. E. W. Smith, Mr. John Terrace, Mr. J. B. Forbes Watson, Col. C. E. T. Blyth, C.M.G., Mr. B. B. Waller, Mr. Samuel Cutler, Mr. H. D. Madden, Mr. W. E. Price, Mr. E. J. Davison, and Mr. Charles Clare.

MUTUAL INTERESTS.

Mr. F. W. GOODENOUGH remarked that the principle of organized co-operation for mutual advantage had been very generally accepted in the gas industry; and this Society was an outstanding example. Co-operation between those who were not in competition was, of course, an easy matter, calling for little or no self-sacrifice; but the co-operation of those who were in competition was a totally different thing. They were inclined to think that prophecy had come true when they saw the Radiation lion lying down in the Bungalow with the Parkinson lamb; truly, the New World had arrived. This Society provided a very excellent example to others in industry of active co-operation of competitors. This had been demonstrated by the members particularly in their work together on research to secure efficiency, which was of the greatest value to the gas industry. As representing the British Commercial Gas Association, he could say that they appreciated the co-operation with them of the Society—so far as it went. [Laughter.] It always amazed him that the members of the Society did not more fully realize what co-operative publicity and propaganda, the raising of the standard of progress in the industry, and the development of salesmanship meant to them. It meant much more to them in one way than it did to the industry of gas supply, for this reason: One could conceive the gas industry coming to a position when it had no further increase in business, when it had no need for additional meters or apparatus for new consumers, but continued to supply from day to day exactly the same quantity of gas, and to make a very comfortable profit in so doing. Of course, any industry that did not go forward was going back; but, as he had said, it was quite conceivable that the gas industry might arrive at a static position as far as output was concerned. He thought the members of the Society would find themselves far more affected by such absence of progress than would the gas supply industry itself. In saying this, he must not be assumed to be a pessimist as to the prospects of the gas industry. On the contrary, he was very much an optimist. So long as the industry exercised foresight, initiative, and courage, and stuck to the principle of co-operation, there need be no fear as to the future advance of the industry in the service of the public. It was because he felt that in going forward on these lines the Society would be of very real value to the other organizations in the industry that it was a great pleasure to him to propose the toast of "The Society of British Gas Industries." The Society had been exceedingly fortunate in its Presidents; but in no year had they been more so than at the present time. ["Hear, hear."]

THE GREAT COAL INDUSTRY.

The PRESIDENT, in response, remarked that the Society had done work of immense value to the gas industry, and through that to another industry upon which the country so much depended. There was no doubt that on the progress made by the Society depended to a very large extent, not only the prosperity and well-being of the country, but the livelihood of many thousands of men who were engaged in and about the mines of Great Britain. As they all knew, the great mining industry had been going through periods of very exceptional difficulty. They also knew that this country had been blessed by providence with the possession of exceptionally valuable seams of coal, and that it enjoyed a geographical situation which ought to enable it to dispose of all that coal to the greatest possible advantage. They knew that, largely as a result of the war and of conditions produced by the war, they had not during the last ten years been enjoying this advantage as they might have done. Their foreign competitors had been pressing very hardly upon them; and the answer to the question of whether they would regain the great position which they once held depended very largely indeed on the brains and on the efficiency of those who were represented there that evening. In spite of all the valuable work the Society had done, there was no doubt a great deal more to be accomplished. There remained endless possibilities in the commercial exploitation of coal and its products. While thanking the Society for their great kindness to himself during his year of office, he would like to congratulate the members on their new President. He felt sure that Lord Cecil's year of office would in many ways be memorable in the annals of the Society.

A PROUD RECORD.

Sir ARTHUR DUCKHAM said it was his privilege to propose the toast of "The Gas Industry"—the industry which was the servant of the public above any other industry in this country to-day. ["Hear, hear.] It was an industry which possessed an extraordinarily proud record—a record of continuity of service that was equalled by no other public service in this country. The desire to serve, the determination always to supply, at whatever cost, had become part of the industry. The idea of service was the basis of the industry. It was an industry which handled in the best and most economical way their greatest national resources—the coal deposits. The gas industry had made available to the community, in one form or another, some 80 p.ct. of the energy that was originally in the coal. To-day about 90 p.ct. of the people in this country cooked by gas. The gas industry started as a monopoly, and various restrictions had been placed upon it which had retarded its development. It was hard to get these restrictions removed from the industry in order to allow it to meet the requirements of the public in the best possible way. By these restrictions it had been hampered in its competition with electricity. They were all hopeful that before the present Parliament was dissolved the position of the industry would have been bettered; and they trusted that when the new Parliament was in its place at Westminster the industry would receive that sympathy and support which it so well deserved, and that greater freedom which would enable it to broaden its basis and to go forward, not only as a domestic service, but increasingly as an industrial service. Great improvements had been made in the manufacture, distribution, and use of gas; and developments in all directions were watched sympathetically; with the earnest desire to take advantage of anything that seemed likely to benefit the industry. The working of new low-temperature carbonization plants was closely followed; and to-day no one could say just where this process was going to lead them. If somebody could indicate a method which was easy of operation and by which the value of the tars from low-temperature carbonization could be made to compensate for the loss of gas, he was certain the gas industry would be the first to take it up. The industry could not, however, afford to undertake big experiments without feeling assured of a really sound financial result.

COKE AND GAS MAKING.

Another matter to which he (Sir Arthur) would like briefly to refer was the development of the coke oven, which was attracting the attention of the gas industry to-day. In the past coal and labour were cheap, and coke was made at a low cost; but now times were harder, and the collieries were desirous of making coke with their slacks. With modern practice there was more gas available, and there was coke suitable for the domestic market; while with bye-product ovens there were in addition tar and ammonia. All this was to the benefit of the country. They must work together in these matters. There was this supply of gas available; but they must all feel that the control of the quality, &c., should remain in the hands of the gas industry. The gas industry had well maintained its traditions; and it did not want Government interference or Government control. ["Hear, hear."] They must unite in preventing the necessity for any Government control or interference. He felt this most strongly; and he was certain that with a united front they would prevent it. No doubt it was right that the Government should control conditions of supply; but surely those connected with the industry could themselves see that the best possible use was made of the fuel of the country. Splendid as its publicity had been, he did not think the gas industry had been properly appreciated in the past. While their industry accounted for 80 p.ct. of the heat in the coal, the electrical industry could account, at their best, for but 20 p.ct.—the other 80 p.ct. of the heat units being lost. These two great industries must go ahead in working for the prosperity of the country. This was what they had to look forward to; but at the same time, they must take care that their endeavours were not minimized by unfair competition. Everyone must be glad to see that Mr. Frank Jones was taking a more and more prominent part in the affairs of the industry.

PROGRESS EVERYWHERE.

Mr. FRANK H. JONES, replying, said the gas industry was not the person who made the gas or the person who sold it; it was the persons who, from the beginning to the end, fulfilled all the requirements of this great industry. He knew some people thought they should move about in water-tight compartments, but this was not his view. He could not imagine the gas industry standing still. He was acquainted with the returns of a great many gas undertakings in this country and abroad; and the signs were that they were everywhere progressing. When this progress ceased, they would all go down together. If gas was available from a source where coal was, and it could be more economically taken from the particular point to any other, this had got to be done. It would be no use fighting against that. The future of the gas industry was in their hands, and they would have to rely upon themselves entirely.

ERADICATE "CLASS DISTINCTION."

Dr. E. W. SMITH, submitting the toast of "Our Guests," said it had been brought to his attention on numerous occasions that, while the Society was both willing and anxious to take its share with the other constituent parts of the industry, it was extremely difficult in some directions to be really effective in helping the industry, because of what might be called the "class distinction" between the producing side and the contracting side. Personally, he

was proud to be on the contracting side, as he believed there would not be anything like the same opportunity of working for the industry if he were in any other position. It was a privilege to be with a progressive firm working on behalf of the industry. There was, however, that class distinction, which made for differentiation and a prejudice which should not exist. Until this prejudice was eradicated, it would not be possible for the other side to co-operate with the Society to the extent it should, and he urged them all to give careful consideration to the possibilities of such greater co-operation. The Society were waiting to serve the industry in a much better way than they could do as an isolated section, and they would follow the lead of the other side just as far as they were permitted to do so. It should be possible for the technicians and others on the contracting side to take their place on equality with the rest of the industry in the counsels of the industry. It was possible in other countries, and why it should not be so here he could not see. He would point out to the other side of the industry that they were not exempt from the charge of being contractors in the matter of coke and tar sales, &c. To him the whole position appeared illogical. It was very necessary that those in charge of the gas producing side should seriously consider the disadvantage of limiting the possibilities of co-operation. They should realize that it was not just at dinners and convivial gatherings and golf competitions that co-operation was welcomed, and that although there was a certain amount of co-operation, it should be extended.

The Institution and the Society.

Mr. John Terrace, who responded to the toast, remarked that, as President of the Institution of Gas Engineers, he would like to make a few remarks on the relationship existing between the Institution and the Society. The Institution had always given the Society all the support that it could, and had helped it in many ways. Taking the executive side first, the Society had had three very prominent Presidents in years gone by, starting with the second year of existence with Sir George Livesey. In 1912 Sir Corbet Woodall filled the position, and in more recent years there was Sir David Milne-Watson. This showed that the executive side of the industry had very much at heart the success of the Society. On the technical side, too, the Institution had shown great interest in the Society, and had worked with that body on Joint Committees in matters of research. He felt that, not only would it be necessary for them to do so in the future, but that the relationship between the Institution and the Society must become very much closer as the years went by, if each of them was going to render to the industry the service which it so greatly needed. With regard to the Charter, when this question first arose a certain technical body decided that it was desirable to lodge an objection. Until that was removed, matters could not proceed rapidly. This objection was dropped some months ago, and the Charter had now gone up to the Privy Council for examination. This, of course, took time, and they could not at the moment say anything definite. The Privy Council, however, expected to hold two meetings during May; and they were hopeful that at one of these they would receive the signature which was necessary. This brought him to the next step in connection with co-operation between the Institution and the Society. The alteration of the rules and regulations would so open the doors to those in the gas industry outside the present body of the Institution of Gas Engineers, that they trusted in this way to have the help, advice, and co-operation within their own organization of members of the Society. But having said this, he did not think it brought them so close together as they would need to be.

Problems Should be Jointly Considered.

He had already referred to co-operation on Committees in the matter of research, but he wished to put very seriously to them that night another point of view; and if he did not tell them how it could be done, it was because he could not see the answer. He hoped, however, that members of the Society and of the Institution would give serious thought to the difficulty he was going to put before them. The Institution for a number of years past had done valuable work in research. It was to the credit of the Institution that they had shown the way in which tests should be carried out on carbonizing plant—a test which had been made use of by many engineers, and had been of great benefit to the contractors. They had also shown what was necessary in the way of tests for gas fires; and this also had proved to be a great help. By co-operation they had tackled the problem of gas meters and corrosion; and by means of another Committee they had gone into the matter of corrosion of pipes. But apart from this there had been valuable researches carried out by the Institution which he submitted did not apear to have been taken full advantage of by those who were manufacturers of the apparatus in which the conditions dealt with might exist. It was perhaps not surprising that during the past year one should have heard suggestions that the Institution should set up some testing laboratory where they would be able to stamp all goods which might come up to a certain specification, thus following upon the lines of what had been done in the United States. He thought that the apparatus manufactured in this country was as a rule very good; but there were some points which should be threshed out between the members of the Institution and of the Society, which at the present time he did not see could be done by any Joint Committee or specification. He was referring more particularly to such questions as the standard sizes of meters. It seemed ridiculous that they should have so many different sizes. As an engineer, he looked forward to the time when they would be able to meet the whole of their ordinary requirements with two sizes of meters. Another matter which presented difficulty was the information which was being obtained through the research on the question of the combustion of gases in confined spaces. He did not at the moment quite see how they were going to do it, but there was great need for discussion and arrangement between some people on each side who knew what should be done to try to get types of apparatus to consume the quantity of gas for which they were rated, and to give the duty which the makers said they should. He was referring more particularly now to the question of geysers. He would suggest that it was not necessary for the Institution to take the initiative in every case. As President this year he would have welcomed—and he was sure other Presidents would welcome—suggestions coming from those outside the Institution. He could not see why the Society, who had been for so long closely connected with everything in the gas industry, should hesitate to come forward and openly discuss these problems with the members of the Institution. Personally, he felt that the greatest service which could be done to the industry in the future was by co-operation between everyone connected with it.

The Work of the Society.

Mr. R. J. Milbourne submitted the final toast—that of "Our New President." He remarked that the name of Lord Cecil of Chelwood was a household word throughout the length and breadth of the land. His ancestral origin alone compelled them to look for some indication of exceptional brilliance and ability. But even if his association with the past were wholly unknown to them, his own accomplishments and achievements in the political, social, legal, and industrial world, and the valuable services he had rendered to the country, were more than sufficient to make them all feel proud of having secured his services as President. The Society was an association of British manufacturers whose members were engaged in many diverse sectional branches, who made plant and appliances for producing, distributing, and using gas; and they were therefore interested in the development and prosperity of this great industry, and deeply concerned in bringing to perfection the apparatus for the innumerable applications of gas, not only for lighting, cooking, and domestic heating, but also for a very large number of industrial purposes. Through their work as manufacturers, they might claim to have rendered signal service in advancing the interests of an industry which had played an important part in the economic, industrial, and social life of the community. There was every indication that the application of gas to industrial processes was rapidly extending. Gas was now recognized as one of the important necessities of modern life; and the public demanded that light, heat, and power should be supplied to them by more convenient methods than in former days. Consequently, gas was now used in directions, and to an extent, never dreamed of in days easily within the memory of many of those present.

The New President.

The constitution of the Society, Mr. Milbourne continued, allowed them to go outside their own roll of members for their President, and this freedom enabled them to secure the services of men of distinction and exceptional ability to fill that position. They felt that their new President was a worthy successor to the many able and distinguished men who had preceded him; and he would be assisting an industry which had a record to its credit of more than a century of useful service to the nation. During all these years, it had a constantly expanding growth, yet, in spite of its age, it was as progressive and up-to-date as any industry of more recent origin. All they now required to develop still further the industry was a revision of the obsolete Acts imposed by Parliament. They felt sure that the new President and Vice-Presidents would, whenever opportunity offered, plead their cause, and assist in obtaining for the gas industry the same freedom in supplying and distributing light, heat, and power as was enjoyed by their competitors.

Great Names in the Industry.

Viscount Cecil of Chelwood, responding, said that though he could not pretend to be an expert in the business in which they were engaged, he did have at one time a certain connection with the gas industry. He remembered very well, and was profoundly grateful for it, the fact that when he was at the Parliamentary Bar he had the great distinction of being one of the Counsel for the South Metropolitan Gas Company; and in that capacity he came across a variety of gentlemen. Among them were Sir Corbet Woodall, Mr. Harry Jones, and, above all, the Chairman of the Company, Sir George Livesey. He would be very ungrateful indeed if he did not acknowledge the profound debt of gratitude he owed to Sir George Livesey, who was an exceedingly remarkable man. He knew his own business as well as anybody, and he had a great breadth of mind and a great power of seeing, not only the best thing to do for to-morrow, but for next year, and for ten years hence. He made great changes, or was largely instrumental in making them; and everyone now admitted that those changes had produced the most admirable results. ["Hear, hear."] A great deal had been said about co-operation and competition. In a sense they were, of course, opposed principles; but no one believed that any industry could succeed without so much competition as would give to it a standard of excellence. On the other hand, no one would doubt nowadays that competition carried to a certain point was one of the most wasteful of all human follies. It was Sir George Livesey's great title to fame that he recognized that to the full, and established as one of his great principles of business management the great ideal of co-operation of all those engaged in the industry—not only employers and employed, but consumers as well—and among all the branches of industry connected with his main industry. There had been complaint of the exceptional difficulties under which the gas industry was placed. Yet the gas industry was among the most progressive and most flourishing industries in this country. Certainly, there was nothing worse for any human endeavour, or for any industry, than to be coddled by the State. It was far better that it should be left to fight its own battles—controlled, as all human endeavour must be controlled, but taught to rely on its own exertions as the only source of its prosperity. [Applause.]

BRITISH COMMERCIAL GAS ASSOCIATION.

Scottish District Conference.

A Scottish District Conference of the British Commercial Gas Association was held in the Cowdray Hall, Aberdeen, on May 2. Councillor GEORGE CATTO, who is Convener of the Aberdeen Corporation Gas Committee, presided.

In the absence of Lord Provost Lewis, an official welcome was extended to the delegates by Baillie REID, the Senior Magistrate. If there was one thing that Aberdeen was proud of, he said, it was its gas undertaking. In Councillor Catto, he continued, the city had an excellent Gas Convener, and they were equally fortunate in their Gas Engineer, Mr. S. Milne. Between them they had brought the gas undertaking in Aberdeen to a high state of perfection. Gas was becoming more popular year by year. When electricity came into being, it was said that the day of gas was over. It was a peculiar thing, however, that even with the large electricity undertaking in Aberdeen, the gas-works were producing more gas to-day than they had ever done before. This was in large measure due to the amount of gas consumed for cooking and heating. The gas exhibition which was being held in the city that week had indicated the tremendous interest that was being taken in gas.

Mr. W. M. MASON, Manager of the "B.C.G.A.," returning thanks for the cordial civic welcome accorded by Baillie Reid, said that in the gas industry, as represented at that day's conference, there was a wonderful asset in dealing with municipal problems such as housing, smoke abatement, and public health.

The CHAIRMAN, in his introductory remarks, said that they in Aberdeen were fully cognisant of the important work which the Association rendered. After tracing the history of the gas undertaking in the city, dating as far back as 1824, when there was formed in Aberdeen the Aberdeen Gas Light Company, Councillor Catto said that the remarkable progress of the city's gas undertaking had been achieved by close attention not only to the financial side, but also to the technical side. They had been particularly fortunate in the latter respect, and, after all, it was not a committee which ran any gas undertaking—the responsibility was mainly upon the shoulders of the engineer in charge. At the present time, though the capital account of the Aberdeen Corporation Gas Department ran to £500,000, they had only £43,000 of outstanding debt. They were confident that, in spite of the very active opposition and keen competition of electricity, they, in Aberdeen, could hold their own so far as gas was concerned. They were doing everything possible to popularize its used.

SERVICE TO THE CONSUMER.

By S. MILNE, Engineer and Manager to the Aberdeen Gas Department.

In gas we have a commodity which has become almost as indispensable as water to the home. It finds a place in the lighting and heating of our homes, in cooking our meals, in supplying hot water, for incineration, for refrigeration, for laundry work, and for garage and greenhouse heating.

We have at our disposal a good and useful article, for which there is an ever-increasing demand. To maintain this, the first essential is that gas must be sold at a price that will compete with other forms of light and fuel. Our experience is that the demand will be increased by giving to our consumers increased facilities for its use. It is within the memory of some of us when gas for cooking was the exception rather than the rule, but the introduction of improved appliances for heating and cooking has led to an increased demand for these, with the result that, to-day, gas is in almost universal use as a heating and cooking agent.

Prior to the year 1911, the Aberdeen Corporation rented gas cooking appliances at moderate rentals, but in that year rentals were abolished, and these appliances were given out "on loan." The immediate result of this policy was to increase the consumption of gas from 817 million c.ft. to 1012 millions in five years, or an increase of 23·8 p.ct.

This was a "Service to the Consumer" which has been highly valued, and has resulted in an ever-increasing demand for gas, which has now reached 1670 millions per annum, or 104 p.ct. increase since the introduction of free cooking appliances 17 years ago. This, in turn, has led to a reduction in the price of gas, which to-day is 2s. 3d. per 1000 c.ft. of 500 B.Th.U. gas, or 5·4d. per therm, for the first 10,000 c.ft. per quarter, falling on a block scale to 1s. 8d. per 1000 c.ft., or 4d. per therm.

Gas fires are not given free, but are rented on moderate terms. The reason for the difference in policy between cooking appliances and heating appliances is that experience has shown that a gas cooker, once installed, is more or less in constant use, while a gas fire is, in the majority of cases, only used intermittently. Some years ago, a gentleman, who had come to live in this city, called to inquire about gas fires for his home. He expressed surprise that we were not so up-to-date here as they were in the city from which he came. There, he said, the gas department fitted up entirely free of charge a gas fire in every room if desired, an offer of which he had availed himself, except in the living room and kitchen. I inquired if he used the gas fires in the other 5 or 6 rooms to any extent. "Oh, not very much," he said, "but it was very convenient to have them there, should they be required." I rather think that the city in question has dropped this policy, or has modified it very considerably. A lady called at our Showrooms and wished for a gas iron. She was very much surprised to learn that it would cost her 12s. 6d. "What!" she said, "you would charge for a small thing like that, and give a gas cooker free?" She was assured, I believe, that when the Department commenced to give these irons free, they would not stop at that, but would send a maid to carry out the laundry work for her! Free cookers have, I believe, come to stay, but there is a limit to the services which should be given free to consumers.

We have a scheme whereby the higher-grade and inset fires may be had on hire purchase, and this policy will be extended to the higher-grade cooking appliance, should there be a demand for it.

Gas steam radiators, which are inefficient unless properly attended to, are examined at least twice during the winter season. Several of our clients ask us to take them in during the summer months as they cannot conveniently accommodate them. We do this, and give them an overhaul and label them as belonging to these clients, who pay the full year's rent, though the appliances are only in use half the year, and 5s. extra to cover the expenses of removing and refixing.

Some years ago, we went round the hotels, restaurants, hospitals, &c., and overhauled their gas appliances of every description, and informed the managers that we were prepared to do this at intervals, provided they agreed to pay the cost in time and material involved. In most cases they agreed, and this has since been done systematically, and at a very reasonable cost.

In the case of gas fires, our experience is that they require very little, if any, re-adjustment after they are once set. But after a year's working many of them would be better for an overhaul, cleaning the burner where dust and lime have fallen down the vent, replacing broken radiants, and giving the back brick a coat of wash. These are attended to on request.

Gas cookers require regular cleaning, and, in most cases, I think they are carefully looked after and kept in a fairly hygienic condition, but burners get clogged, and fret plates get broken, and an occasional overhaul is necessary. These also are attended to on request.

Our gas meter inspectors are now trained to overhaul fires and cookers, adjust burners, and handle different types of gas appliances, before they are appointed to a district. They visit their districts five times a year—four of these visits being for meter-reading. On the fifth visit they test meters for "partial indication," compare the state of the index with the previous reading, attend to stiff taps and leaks, and examine the heating and cooking appliances on hire or loan. They put right the minor defects; but the more expensive repairs or adjustments are reported, and attended to by gasfitters. Many complaints come through the inspectors, or are attended to by them. The consumers make a point of mentioning these when the inspector calls, as they know, within a few days, when to expect him. Our meter inspectors thus form the connecting link between the Department and the consumer. Complaints of whatever description receive prompt attention—no matter how trivial.

It may be of interest to state that in Aberdeen we have 48,390 consumers, of whom 18,868 are prepayment consumers—the proportion being 61 p.ct. ordinary and 39 p.ct. prepayment. The prepayment consumers get 35 c.ft. per penny, and no service other than the free cooking appliances and hired fires, if desired. There are 26,363 gas cooking appliances on loan, or one per 1·8 consumers, and 10,579 hired fires and other heating appliances, or one per 4·5 consumers. In addition, there are several hundreds of fires and cookers, and innumerable boiling rings, laundry irons, and wash-boilers, belonging to consumers, of which we do not take particular note.

MAINTENANCE.

In recent years, many different proposals for the maintenance of internal fittings have been suggested and put into operation, but there is no unanimity as to what is the best—some favouring free maintenance of everything, including burners, heating, and cooking appliances, whether belonging to the gas undertaking or not. Others prefer free maintenance to hired articles, and charging for privately owned appliances and for lighting burners.

Prior to 1922, one of the London Companies had periodical inspections at a charge, but the majority of appliances were not

under a systematic scheme of maintenance, except gas lighting burners, the maintenance of which was undertaken at a fixed charge per burner per quarter. This scheme was almost totally confined to business premises, the terms not having proved attractive to the ordinary consumer, in spite of the fact that they involved the Company in substantial financial loss.

In 1922, they started an inspection and overhaul of prepayment meter installations (consisting of lighting fittings and cooker, griller, or ring). All fittings being Company property, the Company was responsible for the maintenance of supply throughout without charge, and each installation was examined at least once in three years. The costs, in this case, were doubtless included in the price charged for the gas used. Again in 1924, the maintenance of lighting burners was attempted. All ordinary meter consumers were canvassed by letter, and subsequently a call was made, offering to clean and adjust burners at 2d. per burner for each cleaning, the cost of renewals to be borne by consumer. Only 25 p.ct. availed themselves of this offer, though the maintenance of lighting burners resulted in a loss of 2s. 4d. per consumer per annum, or 1d. per therm.

The Company in question do not advocate "free maintenance," which recovers all expenses through the gas charges, but their idea is to recover outlay through rental charges on hired appliances, and by direct charges on privately owned appliances.

This Company has now an elaborate scheme involving a body of inspectors. Their duties include testing every single piece of gas appliance, recommending alterations or repairs necessary to private appliances, and executing the necessary repairs to appliances owned by the Company. They also record details of premises and appliances, which details become a basis for future canvassing. The average cost of examination is about 3s. 4d. per consumer. The inspectors canvass for orders, and, in this way, are successful in securing a considerable amount of business.

A corporation undertaking, with a make of about 600 millions, and about 18,000 consumers, employs eight men on maintenance works. The examiners call at every house in their area; they clean and regulate all burners, cooking appliances, gas fires, irons, &c., irrespective of ownership; and new materials are charged for at reasonable rates. They also take a census of all privately owned appliances, and note the size of the supply piping. The cost is about ¼d. per 1000 c.ft. for this service.

In the case of a large gas undertaking in England, all geysers and other water heaters are inspected and overhauled free of charge, at an average cost of 3s. 1¾d. each. All prepayment meter installations are also maintained free of charge, and cost, on an average, 3s. 1½d. each consumer. On request, this Company repairs, free of charge, all cookers and fires, whether hired or privately owned, and do repairs on internal work free, if not costing more than 5s. They have removed, without charge, all water-slide pendants; they relay, free of charge, all defective service pipes, and clean and overhaul lighting burners and globes, charging only for material. Experimenting on the lines of universal maintenance in one district of 6000 consumers, overhauling everything, this Company found that it cost them about 4s. 3d. per consumer, though they expect to improve on this figure.

In the case of a large Scottish gas corporation where a maintenance of fittings scheme was inaugurated, maintenance fitters, under the supervision of a maintenance inspector, examine meter and connections, overhaul burners and appliances, and test for pressure and escapes. This incurred an expense to the department of 3s. 11d. per house, amounting to 1½d. per 1000 c.ft. sold. Other schemes have been reported from time to time as costing from ½d. to 1d. per 1000 c.ft.

The Service Pipe.

Whatever scheme of maintenance will ultimately find most favour—and there is room for differences of opinion as to what is best—there will not be two opinions as to the need for first attention being devoted to the condition of the service pipe. For, if the service pipe be inadequate, no amount of attention to internal appliances will avail in giving satisfaction to the consumer. Were all service pipes of ample capacity, our complaints would be halved, and satisfaction to the consumers doubled. But, again, we may have ever so good a supply up to meter inlet, but that will avail nothing if the outlet be of insufficient size; and the trouble arises when neither the tenant nor the proprietor will produce the desired order for the work to be executed. Our practice in Aberdeen is to lay the service pipe from the main to the inlets of the meters, charging only for the portion within private ground. When services require enlarging or renewing, the same policy obtains. In order to encourage landlords to enlarge or renew services, we cut the price; but even then, it sometimes falls to the consumer to bear the cost—the landlord being obdurate in the matter of expenditure in repairs and maintenance. It is a question for consideration whether it would not be good policy to renew gas services free of cost up to meter inlets, provided the landlord would agree to deal with the pipes beyond the meter.

In this connection, it is interesting to note that the Corporation of Dundee under the Dundee Corporation Order Confirmation Act, 1927, has a clause which has been drafted to meet such a situation. It reads as follows:

> In the event of any occupier of any buildings erected prior to the year 1907 . . . complaining of a deficient supply of gas, and the Corporation, after investigation, being satisfied that the complaint is well founded, the Corporation may, after giving twenty-one days' notice to the owner of their intentions, enter upon the buildings . . . for the purpose of renewing or enlarging the gas pipes from the gas main to the meter . . . which work shall be carried out free of cost to the owner, but the Corporation shall not be obliged to make the said renewal or enlargement unless and until the owner undertakes to enlarge or renew to the satisfaction of the Corporation that portion of the private pipe for conveying the gas from the meter to the lighting burner. . . . In the event of the owner refusing or delaying to undertake to renew or enlarge the private piping . . . the Corporation shall have power to enter upon the said buildings . . . for the purpose of renewing or enlarging the piping from the main to the meter, and charge the owner with the full expense thereof . . . to be recoverable by the Corporation from the owner as a debt. . . .

Briefly, the Corporation have powers to renew the gas service pipe up to the inlet of the meter, free of cost to owner, but may withhold doing so unless and until the owner undertakes to enlarge or renew, to the satisfaction of the Corporation, the private pipes from the meter to the "lighting burner." Should the owner refuse, or unduly delay in doing so, the Corporation may proceed to do the work at the owner's expense.

In the letter which the owner is asked to sign, he agrees to renew the private piping from the meter to the lighting burners, all in conformity with schedule and conditions specified in a letter which the Corporation have sent him. In this letter, it is pointed out that the Corporation will renew the pipe up to inlet of meter, provided the owner undertakes to renew or enlarge, to the satisfaction of the Gas Department, the private piping from the meter to the various lighting burners, so that an adequate supply of gas shall be available for all purposes to each of the tenants of the property. The Gas Department are thus amply safeguarded.

One naturally asks why should this clause specifically apply to buildings erected prior to 1907. I understand the reply is that, under section 65 of the Dundee Corporation Confirmation Act of 1907, the Department obtained powers to specify the sizes of piping to be installed in buildings, and power to refuse a supply of gas unless the specification of the Gas Department was adhered to. Hence, all properties erected since 1907 are presumed to be fitted with pipes of ample size.

When an attempt was made to get owners of old properties to renew or enlarge their gas service pipes, they, through a Landlords' Association, represented that the pipes, in most cases, were adequate for the purposes for which they were intended at the time of installation, but that the use of gas for purposes other than lighting had rendered them inadequate.

Between 1907 and 1927, various concessions were granted by the Corporation, such as relaying services at cost of piping only, labour free; but even with this concession progress was slow.

Eventually, the clause quoted was incorporated in the 1927 Act, and with what result, Mr. Dickson, of Dundee, is, I understand, to be so good as to inform us to-day.

Gas Coke.

I would like to say a word or two in regard to another "Service to the Consumer," which is too seldom referred to as a "Service," and receives too little publicity at our "B.C.G.A." Conferences. It is a service which, in the matter of revenue, is second only to the sale of gas itself. I refer to coke. We have in gas coke a smokeless solid fuel, capable of giving excellent service, which should find far greater outlet than it does in substituting raw coal with all its inherent disadvantages. In Aberdeen, we had available for sale last year 59,523 tons of coke and breeze, and of this quantity about 55,000 tons were consumed within the city and suburbs; there were no shipments.

Our consumers of coke include domestic users, bakers, dairies, laundries, fish-driers, grain-driers, greenhouses, hotels, and restaurants; central heating for hospitals, nursing homes, churches, halls, theatres, and other public buildings; steam motor wagons, and steam-raising in stationary boilers.

Analyzing the sales of coke and breeze for the two months, February and March last, which aggregated 10,046 tons, we find that they were distributed as follows:

For domestic use	4,121 tons,	or 41 p.ct.
,, hospitals, schools, and churches, &c.	345 ,,	or 3½ ,,
,, bakers and dairies	1,101 ,,	or 11 ,,
,, other industries	4,479 ,,	or 44½ ,,
	10,046 tons.	

From these figures, it may be taken that several thousand tons of gas coke are now used every year for domestic purposes in Aberdeen, and this, together with the ever-increasing use of a cheap gas as a fuel, is bound to have its influence in main-

taining that clear, pure atmosphere which is characteristic of our city. It is satisfactory to be able to record that the use of coke is becoming increasingly popular, though even at this time of day we sometimes, but only very occasionally, hear the remark: "Gas coke! How could anyone put up with it? I remember my mother used it, but it was just like slate, and produced a messy white ash." A bad reputation dies hard; and the coke referred to, as used a generation ago, was, for the most part, made from cannel coal and shale. The coke of to-day is, of course, a very fine fuel, and is in such demand that for three months during the past winter we could not supply enough of it, and had to refuse orders.

During the war—in April, 1917—when fuel was dear and scarce, we started a Small Sales Department, and have continued it. We supply to all who come to the Gas-Works for it, a measure of gas coke, for 3d. to 6d. according to the price ruling at the time. The measured quantity weighs about 28 lbs., and is sold at practically the same rate per ton as larger users are paying. This is a real service to the poorer classes of the community, and is largely taken advantage of.

As showing what has been done in this way, we sold 21,998 measures in the week ended Oct. 30, 1926. The largest number in one day was 5218; and on a Saturday of 4½ hours, 3832 measures were sold. These were, of course, in very exceptional times.

"Service to the Consumer" is a large question, and covers many aspects of our activities. There is room for many schemes, diverse in character and in magnitude, and no single scheme will suit every case. One has to determine whether one's present service is sufficient to meet the requirements of the consumer; whether something more is required to ensure complete satisfaction; whether the present staff of inspectors is capable of carrying out these increased duties by a re-adjustment of their present duties; or whether a new organization, with a staff of inspectors and supervisors, should be set up. Again, it is a matter for disucssion whether service should be gratuitous, and should cover every gas appliance, both lighting and heating; or whether free service should be confined to hired articles, and a charge made for maintaining others.

Some are present to-day who have had schemes of maintenance in operation for a considerable time. Of these, some may have started in a small way, and gradually increased their activities. On the other hand, it may be that they have found retrenchment necessary since the inauguration of their scheme. In both cases, there will be something for us to learn from their experience.

In conclusion, I trust that my remarks on this important subject, "Service to the Consumer," may have been successful in stimulating a thought or suggestion or two; that occasion may now be taken by members to rehearse their experiences for the information and guidance of others; whether these experiences have led to success or failure is no matter, for it is by others' faults that wise men learn; and we are all out to learn.

MAINTENANCE OF APPLIANCES.

By J. W. McLUSKY, Engineer to the Glasgow Corporation Gas Department.

The state of consumers' appliances, said the author, was the finest consequence of the industry's service policy. Every responsible gas official ought seriously to consider whether he had reason to be satisfied with his distribution system and with the conditions under which his consumers were using the gas. He would like to suggest one important method whereby the "gas mentality" could be nurtured and developed, and that was by the medium of the satisfied consumer.

Concentrating chiefly on the housewife, as representing the domestic load, the speaker suggested that even to-day the management of many gas undertakings had not grasped completely the importance of establishing a satisfactory and secure relationship between the seller of gas and the housewife. The influence wielded by this latter personage could not be overemphasized; and it was in this respect that maintenance of appliances helped to promote goodwill. In their larger cities they found an entirely different state of affairs ruling in the housing situation than was the case three or four years ago. Gas appliances which might have suited the old consumer might not suit the new. The condition of the appliance, due to the disturbing nature of a removal, might prove anything but attractive to the new tenant, with the result that, instead of having a satisfied consumer, they found the opposite. With systematic and regular maintenance, such a state of things did not exist, as all these dislikes and prejudices were removed on the visit of the maintenance fitter. Could they wonder why people, finding new gas appliances unsatisfactory at the beginning, were liable to transfer their custom to their competitors?

In Glasgow, they were discarding the use of the flexible tube for boiling rings, and were substituting the much safer method of connecting by piping. An important duty of the maintenance fitter, which established confidence among consumers, was the testing of all supply pipes for soundness. These were a few of the many advantages which might be cited in favour of maintenance.

Now, as to cost, he found that the average cost for distribution purposes per 1000 c.ft. of gas sold by 66 municipal gas undertakings was 7·17d. (including maintenance of stoves and fittings). While the same cost in 46 gas companies averaged 10d. were they to assume from this figure that the consumers of gas supplied by companies were receiving more attention to the tune of approximately 3d. per 1000 c.ft.? One thing was certain: Municipal gas undertakings could well afford to spend a further penny per thousand cubic feet on their consumers. It would prove to be an excellent investment.

ENSURING GOOD SERVICE.

By J. DICKSON, Engineer to the Dundee Gas Department.

The author said that the maintenance of consumers' appliances was not in itself a cure for all the ills to which the distribution man was heir. The ideals of constant value, adequate volume, and control of the gas up to the burner were slow in achievement in districts containing tenement property, when sometimes there were as many as from forty to sixty consumers in one block. The matter had to be dealt with root and branch. They were told there was no mystery about successful selling. First, their product must be right; secondly, they must have attractive prices; and thirdly, they must make their product known. There was only one meaning to this, and that was wholehearted support of the efforts of the "B.C.G.A." in national publicity, aided by local propaganda. Fourthly, they must have good distribution. This meant gas control up to the burner. Lastly, they were selling a product regarding which their obligations continued after the sale of the commodity. They must follow up their efforts in efficient production and good distribution by a scheme of maintenance of all gas-using appliances; and all these efforts meant expenditure of energy and money.

It was on the sales side that efforts must be directed towards the improvement of the quality of their service to that standard which would warrant the public continuing their patronage at a time in which the industry was meeting the fiercest competition it had ever been called upon to face. They required to give increasing attention to workshop, demonstration, and showroom facilities. It was an astonishing feature of some distribution departments to-day that, in spite of a considerable increase of sales, they still operated with little more than the same workshop accommodation which had served for three decades or more. To continue to give efficient service in cramped conditions was, of course, impossible.

BENEFITS OF GAS COOKING.

By Miss M. K. GOMPERTZ, M.C.A.

Miss Gompertz said that the greatest difficulty with which they had to contend was that the public would not act upon printed instructions. If only they would "read, mark, learn, and inwardly digest" the pamphlets issued by the gas companies and by the stove manufacturers, a still further saving of time and expense would follow. In addition to this, there were apathy and indifference. Sometimes the cook, instead of trying to reason out the cause of a certain failure, appealed for assistance to the gas company, and the company were not always able to put the matter right. She put in a plea for more trained women on the staffs of the larger gas undertakings, as she was sure this would pay in the long run. These women, who would, of course, be thoroughly trained, would go about the district helping and advising people in their difficulties with the cooker, as well as giving public demonstrations from time to time. In this manner the public would be educated as to the advantages of the gas cooker over any other kind of cooker.

Though they in the gas industry might appreciate the value of gas, it was only by continual propaganda in the Press, and by frequent lectures and demonstrations, that they could make the public realize this value.

LUNCHEON.

At the close of the morning session, the delegates were entertained at luncheon in the Palace Hotel by the Aberdeen Corporation; Councillor CATTO presiding over a company which included many of the civic heads, a number of prominent business people, and most of the municipal officials.

Mr. DAVID FULTON (Engineer and Manager to the Helensburgh Gas Department) proposed the toast of "The City of Aberdeen;" and Baillie REID responded.

The CHAIRMAN, proposing the toast of "The Gas Industry," said that gas had become an institution, but many people did not realize the various activities of the industry and the great part it played in every-day life. It had gone in systematically for research; and there was hardly an industry that one could mention which was not to some extent dependent upon the gas industry.

Mr. J. W. NAPIER (Engineer and Manager to the Alloa Gas Department and President of the North British Association of

Gas Managers), replying, complimented the Aberdeen Gas Department on their efficient management.

"The Chairman" was given by Mr. W. M. MASON.

GAS IN RELATION TO PUBLIC HEALTH.

By Dr. J. PARLANE KINLOCH, Chief Medical Officer, Department of Health for Scotland.

At the afternoon session, Dr. Kinloch, in a paper on "Gas in Relation to Public Health," appealed to the great gas and electricity corporations, and also to the coal producing industry, to work together, and use their resources in money and men to secure the abatement of smoke pollution of the atmosphere, and so finally provide a healthy environment for the people, and also to make available to the community in dwelling houses, as well as in factories, the best systems of radiant heating, of ventilation and illumination, and of labour-saving devices.

The author referred to the damage done to human life by the existing pollution of the atmosphere by smoke. He showed that, while the general death-rate in the country from all diseases, and the infantile death-rate, were steadily being reduced, the death-rate from the great group of respiratory diseases was maintaining its old level, and was increasing in those large cities where smoke pollution of the atmosphere was at its worst. The partial abatement of this smoke pollution which had already been obtained by the increasing use of gas and electricity had had a notable effect in reducing the incidence of the graver forms of rickets in the community; but there was still a vast mass of disease and disability due to rickets, which would only be finally removed when the present atmospheric pollution was prevented.

Councillor J. S. DOEG (Convener of the Aberdeen Public Health Committee), who took part in the discussion that followed, said he thought the public had great reason to be thankful for the work of the gas engineers in the past.

Councillor HENRY ALEXANDER (Convener of the Aberdeen Corporation Town Planning Committee), in his contribution to the discussion from the angle of gas development and town planning, spoke of the important part which the gas industry would play in the city of the future. They wished, he said, to place their towns so that they would be efficient, and so that they would function properly in every department; and the increasing use of gas as a fuel was going to help enormously to this end. Coal carting was one of the factors of the traffic problem in large towns and cities; and it could be greatly reduced—and, he hoped, would be greatly reduced—by converting coal into gas at central establishments, and sending it to the consumer in pipes under the streets.

GAS IN UNITED STATES NAVY YARD.

By J. H. GUMZ, Industrial Gas Engineer to the Pacific Gas and Electric Company.

From an Article in the "Gas Age-Record" for March 16.

During 1925 negotiations were entered into between the Pacific Gas and Electric Company and Mare Island Navy Yard relative to the possible use of gas in the shops of the Navy Yard. The result of the negotiations was that the Company extended high-pressure gas service to the yard. An indication of the size of the extensions may be gained from the fact that the Company now have invested something over $55,000 in mains and laterals, supplying various industrial activities in the yard. The principal main is 6-in. steel pipe, and runs for more than a mile from end to end of the industrial section of the yard.

All the mains in the yard are maintained at 10 lbs. pressure by means of a regulator at the entrance to the yard, where a master meter is also located. The gas supplied is oil gas of 550 B.Th.U. per c.ft. Service is supplied from the Vallejo gas plant at approximately 25 lbs. pressure through a 3-in. line laid on the causeway leading to Mare Island. About a year after service was established a ship crashed into the causeway, wrecking a 12-in. cast-iron water main and putting the causeway out of commission for a number of days. However, the welded gas line withstood the shock, and, though bowed a bit, was not damaged. In general, it is one of the policies of the Navy to make the yard independent of outside sources of power, but is also a policy to endeavour to provide the best equipment possible to assure low operating and construction costs.

The various shops on Mare Island use gas at 10 lbs. pressure except in a few cases where individual regulators reduce it to 6 in. of water pressure. Sub-meters permit the accurate distribution of the gas costs to the various shop activities making use of the gas. The average rate paid for the gas is 62.7 cents per 1000 c.ft. for a consumption of 1 million c.ft. per month, 58.3 cents per 1000 c.ft. for 2 millions, and 55.9 cents per 1000 c.ft. for 3 millions. The average rate now being earned is approximately 55 cents per 1000 c.ft.

In the shops employing between 5000 and 6000 men, there are so many uses for gas it is impossible to describe them all in one short article, but brief mention of some and more detailed description of others may prove of interest.

One of the first uses gas was put to in the yard was for heating soldering coppers and in torches in the sheet metal shop. Prior to gas being used, hydrogen was employed as a fuel. Hydrogen is a bye-product from the yard oxygen plant, but the cost of compressing and transporting the hydrogen from the oxygen plant to the sheet metal shop was many times greater than the cost of the manufactured gas.

Naval ship work involves a tremendous amount of copper pipe, which must be bent into intricate curves and shapes. Formerly, oil torches and forges were used for much of this work; but the smoke and lack of control of these oil fires were a nuisance, to say nothing of the increased labour cost involved. The clean, smokeless gas torches, which could be instantly turned up to the maximum, meant better working conditions for the men and also better work, and on the whole a reduction in over-all cost.

Gas is also used for babbitt melting, in small heat-treating furnaces, submarine battery work, and for straightening destroyer manganese bronze propeller blades weighing thousands of pounds, and which, for perfect work, need a temperature control within 20°. The ability to control the temperature and straighten badly bent propellers means a saving to the Government of about $5000 for each propeller so salvaged.

Shortly after gas service was begun in the yard, in January, 1926, the coke-fired galvanizing kettle gave out, and plans were at once formulated for its replacement. In the meantime all galvanizing was done in a 6-ft. kettle 36 in. wide. The kettle was electrically heated and thermostatically controlled.

Plans were presented to the shop superintendent covering the installation of a gas-heated kettle to replace the burned-out coke kettle. The kettle was to be thermostatically controlled; and based on the amount of work being galvanized, an estimate was made showing that the gas cost would closely approximate coke cost, and probably be lower. The project looked so feasible that work was begun on the installation of a 12-ft. V-shaped kettle 36 in. deep and 35 in. wide at the top. The casing was ⅜-in. plate lined with 4½ in. of insulating brick, and the refractory lining was made of 9-in. good-grade firebrick. Instead of ventilation taking place directly into the galvanizing room, flues were constructed leading down through the floor, and then about 40 ft. to a stack. Eleven Surface Combustion Company burners on each side of the kettle, supplied with a correct gas-air mixture from high-pressure inspirators, made up the heating equipment. A Robertshaw temperature controller furnished the necessary regulation.

A test was made to determine uniformity of heating. Over a long period the temperature at six points fell within a range of 20°. Such a variation of *plus* or *minus* 10° Fahr. in a 14-ton mass of zinc 12 ft. long is little less than phenomenal.

Other tests were made to determine the variation of temperature throughout a working day. The temperature varied less than *plus* or *minus* 15° Fahr. Part of this rather wide range was due to the metal increasing some 10° above the point for which the thermostat was set, due to the rapid heating-up in the morning.

The amount of gas consumed per pound of material melted increases rapidly as the kettle is worked at less than 40 p.ct. of its hourly capacity. This particular kettle has a maximum capacity of approximately 1500 lbs. of material per hour with a maximum gas consumption of 1150 c.ft. per hour. Only about 20 p.ct. of the total heat in the gas used goes out through the stack; the balance being expended in useful work.

A safety device has been installed on this kettle to assure that the metal will not be overheated at night should the thermostat fail to function. As this is written, the kettle has been in use thirty-two months and seemingly still has a long life ahead. When consideration is given to the fact that the life of a galvanizing kettle normally ranges from nine to fifteen months, the Mare Island kettle holds something of a record.

The total monthly gas used for the volume of work going through at the time the test was made was 258,000 c.ft., which, at an average rate of 87 cents per 1000 c.ft. at that time, cost $224 per month. This is practically the same as the monthly cost of the electric galvanizing kettle, which, though but one-half as large as the gas-fired kettle, used about 210,000 KW.-hour at $0·011 per KW.-hour,

For the thirty-one months ended Jan. 20 of this year, the 12-ft. kettle used 7,860,000 c.ft. of gas, or an average of 253,000 c.ft. per month. Using an average cost of 56 cents per 1000 c.ft., the monthly cost of this kettle is $141.

PARTINGTON GAS-WORKS.

Inauguration of the Latest Manufacturing Station of the Manchester Corporation Gas Department, May 8, 1929.

In 1923 a scheme of considerable extension and reconstruction of the Bradford Road Station of the Manchester Corporation Gas Department was completed. The remodelled works is capable of producing a total of 22 million c.ft. of gas per day. The carbonizing plant consists of Drakes horizontal and Glover-West and Woodall Duckham vertical retorts—in four separate units of about 4 million c.ft. daily capacity—and other features of the station include a complete Stirling boiler installation with coke breeze underfeed stokers and ash removal contrivances. The whole of the exhausting, condensing, washing, coal breaking, and elevating plant is of modern design. To meet the current demand for gas, it would have been necessary to reconstruct the Gaythorn Works entirely, and the cost would have been out of all proportion to the economies which could have been effected. In addition there would still have been no provision for the future expansion which the increasing consumption of gas in recent years has warranted. The Committee, therefore, decided that the proper place for a new works was outside the congested area of the city; and the site at Partington was chosen as being suitable to the future requirements of the undertaking. These works are being officially inaugurated to-day.

Manufacturing Facilities.

To meet the demand for gas the Department has now four stations, the areas and capacities of which are shown in the following table:

Stations.	Area.		Producing Power (24 Hours). C.Ft.	Storage Capacity. C.Ft.
	Acres.	Sq. Yds.		
Rochdale Road	9	339	5,500,000	4,360,000
Bradford Road	51	3556	22,000,000	17,000,000
Droylsden	4	3789	500,000	600,000
Partington (to date)	174	1936	8,000,000	5,000,000

The Gaythorn Works ceased production on Jan. 24 of this year, immediately after the new Partington Works had been brought into operation, a portion of the area being retained as a distributing centre. The storage capacity at Gaythorn is 5,430,000 c.ft., and a 5 million c.ft. waterless gasholder is under construction at the Bradford Road Works.

The Present Position.

The following figures show the present position of the undertaking:

Capital employed	£5,979,692
Outstanding capital debt	£2,534,884
Total assets	£6,594,274
Total liabilities	£2,892,584
Total income	£1,523,000
Coal carbonized	439,371 tons
Gas made	7,620,200,000 c.ft.
Coke made	302,198 tons
Tar produced	5,430,385 galls.
Sulphate of ammonia made	4795 tons
Area of works, &c.	272 acres 1512 sq. yds.
Area of gas supply	53¼ sq. miles
Producing capacity of works per 24 hours	36,000,000 c.ft.
Declared calorific value	450 B.Th.U. per c.ft.
Actual average calorific value	461 " " "
Number of consumers—	
Ordinary	118,080
Automatic	95,319
Number of cookers and grillers	169,678
Number of gas fires	47,217
Miles of main	1,128

Partington.

The choice of the site for the new gas-works, rendered necessary by the steady growth of the demand for gas, has followed the trend of modern ideas. Partington is an ideal site. It is well outside the City boundaries. Its altitude is such that gas will generally pass to the area to be supplied with very slight mechanical assistance. The first unit of 8 million c.ft. daily capacity is now completed.

The site covers an area of 175 acres, and lies on both sides of the Cheshire Lines Railway in the vicinity of Partington Station, and direct communication has been established with that railway. The scheme necessitated a disturbance of the existing goods yards at Partington, involving its removal from a point east of the station in a westerly direction, and its accomodation behind the station buildings on the down side of the line. Adequate provision has been made for the eventual increase in traffic requirements. To accomplish these alterations and their consequential works, some 9000 sq. yds. of land, the property of the Cheshire Lines Committee, was exchanged for an adjacent equivalent area belonging to the Manchester Corporation, and the substitution of a public road for one which it was necessary to absorb in the development of the scheme. Many thousands of tons of earth were required to level the ground to correspond with the elevation of the main running lines, and, in order to provide access from one side of the gas-works to the other, the railway embankment was cut through, and a road 40 ft. wide constructed, spanned by a steel bridge carrying the main lines over it. This work was carried out by Messrs. A. Monk & Co., of Irlam.

Coal Store.

The general level of the site is some 22 ft. 6 in. below that of the railway. This fortunate circumstance made it possible to construct a large coal store in the form of a reinforced concrete structure arranged below the overhead sidings. The construction of this work was entrusted to the Fram Reinforced Concrete Company, of Manchester.

The coal store is some 440 ft. long by 150 ft. wide, and has a capacity of 33,000 tons of coal, with provision for a further extension to hold 18,000 tons. Reinforced concrete proved an ideal material for this work. It has enabled the maximum use to be made of the available space, and it involves absolutely no provision for maintenance such as would have been inevitable with any other material. The walls of the store are 30 ft. 6 in. high from their foundations. They are designed with 7½ in. thick panels spanning between substantial counterforts arranged at 10 ft. centres. The back wall of the store acts as a retaining wall for the embankment carrying the main line sidings, and this wall has been continued for a further 240 ft. beyond the end of the coal store as at present built. Three double lines of railway are carried over the coal store for the full length, so that trains of wagons may be shunted and discharged in any part of the store. The lines are carried upon reinforced concrete beams supported by braced piers constructed in the same material and spaced at 20 ft. centres. Cantilevers from the beams support walking platforms for the use of the personnel attending to the discharge of the wagons. Connection is made with the main railway siding by a gantry and a 40 ft. bridge, both in ferro-concrete, carrying two sets of metals. A second bridge of the same design is built alongside to give access to the sidings for parking empty wagons. The floor of the coal store is constructed in the form of a reinforced concrete raft bearing upon the peat below.

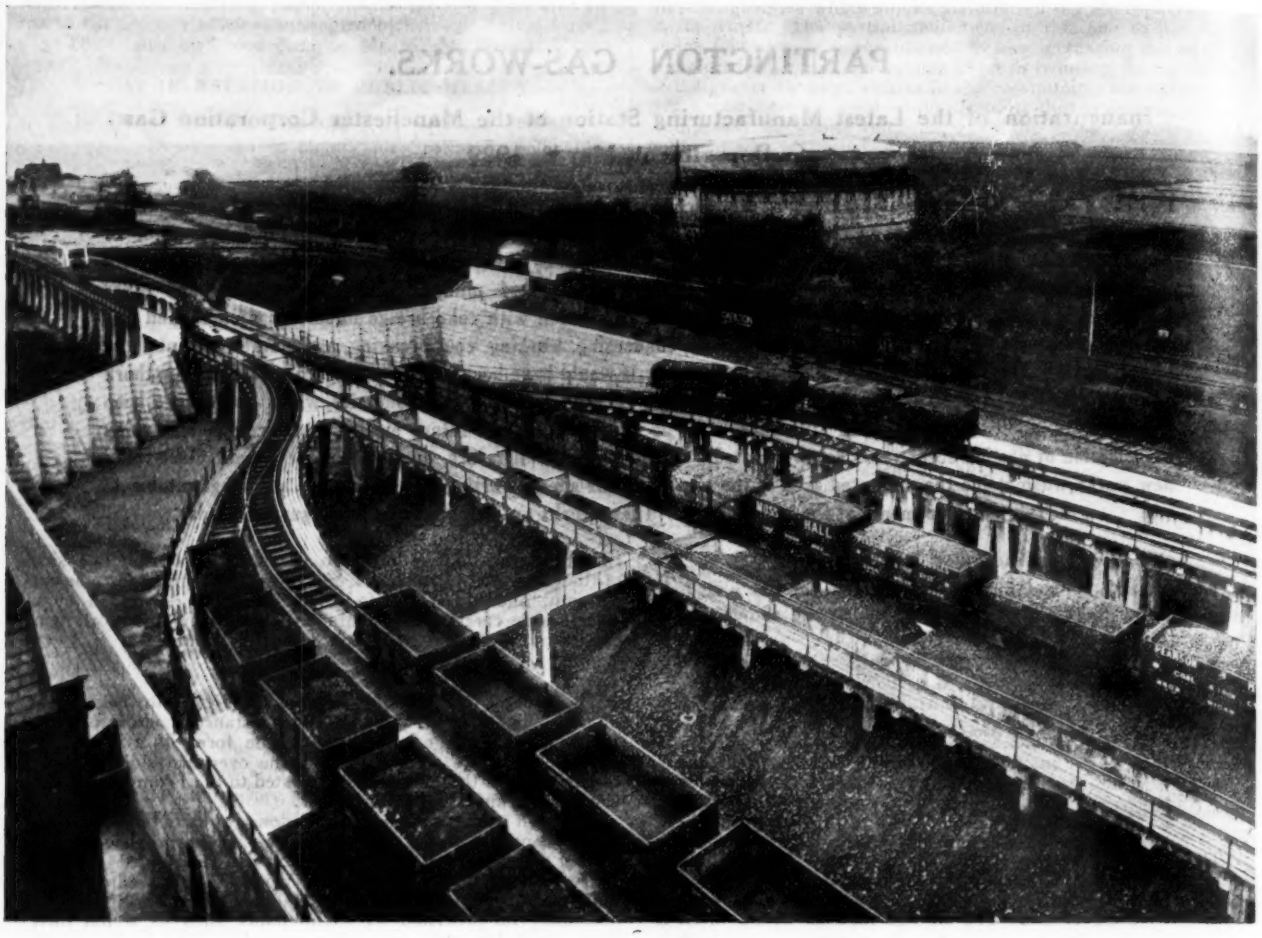
All the concrete used in the construction of this work was mixed in the following proportions:

27 c.ft. ¾-in. hard flagrock aggregate;
13 c.ft. washed Mersey sand;
694 lbs. best British Portland Cement.

The reinforcement consisted of British standard mild steel round bars of varying diameter, with a tensile strength of from 28 to 32 tons per sq. in. The shuttering or false work forming the moulds for the concrete work was built up with light steel sheets with a special interlocking device obviating leakage of the cement grout during pouring, and leaving a solid compact face on the finished concrete. A specially designed portable mixing, elevating, and chuting plant was employed in the preparation and placing of the concrete, allowing a very large daily output, and reducing construction joints to a minimum. Incorporated with the coal store construction were the houses and bridges for the two wagon weighing machines, and the coal breaker houses for each of the retort houses.

Foundations.

Considerable care and skill were required in the design and construction of the foundations. The top layer of the soil for a depth varying from 2 to 5 ft. consists of peat. Below this is a layer of wet sand about 18 in. thick, and below this lies 3 ft. of spongy clay, which gradually stiffens in consistency until hard blue clay is reached at about 8 ft. below the ground level, the whole lying upon the new red sandstone at about 20 ft. below the surface. Coal-breaker pits and all



COAL STORE AND SIDINGS.

underground tunnels and chamber work were lined with rock asphalt to exclude water.

It was not considered advisable to stress the ground to more than 2 tons per sq. ft., so that, in the case of the vertical retort house which covers a very small ground area, and in which the loads are concentrated upon stanchions to the extent of as much as 200 tons each, special attention had to be given to the problem of distributing these loads to secure even bearing over the subsoil. Heavily reinforced concrete beams were designed to carry the stanchions of the retort bench, with lighter beams for the outside walls of the building, and all were carried down to the clay. As the horizontal retort bench covers a much larger area, it was carried by a mass concrete bed 6 ft. 6 in. thick with reinforced concrete beams supporting the walls of the retort house and the internal stanchions. The floors of both retort houses are carried upon reinforced concrete rafts spanning between the main beams. The foundations of the external producers and the building containing them are similar in design.

The whole of this work was also carried out by the Fram Reinforced Concrete Company.

Weighing the Coal.

The whole of the incoming coal passes over one or other of the two 40-ton weighbridges installed at the end of the coal store. These were supplied and fixed by Messrs. Wm. Hodgson & Sons, of Salford. They are of the latest self-contained type with platforms 18 ft. long; and the two steelyards are housed in a weigh office situated between the two railway tracks.

Carbonizing Plant.

The carbonizing plant is constructed in two sections, one consisting of Glover-West vertical retorts supplied and erected by Messrs. West's Gas Improvement Company, of Manchester, and the other of horizontal retorts supplied and erected by Messrs. Drakes, of Halifax. Each section is of a nominal daily capacity of 4 million c.ft. of gas.

The installation of vertical retorts is built in two benches, each of four settings, each setting containing eight 40-in. New Model steaming type of Glover-West continuous retorts, arranged in units of four, making a total of 64 retorts. Each setting is heated by a producer built integral with the setting, with grate of the open stepped type; but provision is also made for heating by gas generated in external producers.

Coal Handling Plant.

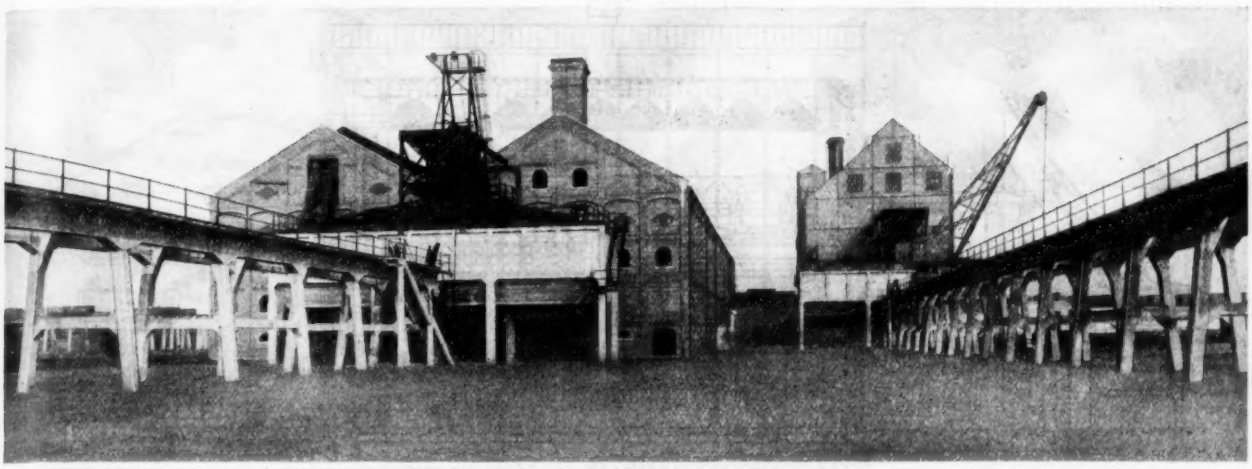
The retort house is arranged at right angles to the elevated coal store. Coal from the railway wagons on the second line is emptied by means of two Babcock and Wilcox electric tippers into a steel coal-receiving hopper, from which it is fed by means of adjustable reciprocating feeders into the mouth of either of two double-roll West coal breakers. From either of the coal breakers, the broken coal passes into the buckets of either of the two West lip-bucket conveyors, which convey and elevate to, and distribute it in, the overhead coal-storage bunkers arranged above the retort benches.

From the bottom mouthpieces of the retorts the coke, cooled within the retort, is discharged into the buckets of either of the same two lip-bucket conveyors which convey, elevate, and discharge it into (*a*) the producer and retort feed hopper, or (*b*) either or both of the two coke screens arranged above the coke-storage hoppers, or (*c*) the central compartment of the coke hoppers leading to an automatic skip filler for crane handling in the coke yard.

Vertical Retorts.

The Glover-West New Model retort is definitely designed to take full advantage of the practice of steaming the charge. It consists of the original standard retort superimposed upon a chamber designed to present an enlarged area of incandescent coke to the incoming steam at the base of the retort, so that the steam is superheated to a temperature approaching dissociation before it actually enters the retort proper. By this means the whole of the available heat from the combustion chambers is utilized solely for the purpose of carbonizing the charge of coal, while the sensible heat of the gases, formed by the interaction of the steam with the coke, is available for the purpose of internally heating the core of coal in the retort, while the coke is discharged in a cool condition.

Coal is supplied to the coal-feed hopper placed above each retort, and slowly and continuously descends through the retort to the coke receiving chamber below. The coal passing through the heated retort becomes completely carbonized, and the residual coke is extracted by means of a mechanically-operated extractor at the base of the retort. The speed of the coke extractor determines the rate at which the coal passes through the retorts, each of which can be individually varied to meet any requirements. The coke discharged by the extractor is received, and temporarily stored, in a coke receiving



THE CARBONIZING PLANT.

chamber, from which it is periodically discharged to the coke handling apparatus.

The retorts are surrounded by horizontal tiers of combustion chambers, separately heated and controlled. The products of combustion make their exit from the combustion chambers, and, travelling upwards, enter the upper chambers and circulate round the tops of the retorts, heating the incoming charge of coal, after which they pass away to the waste-heat recovery plant. The secondary air supply for the completion of combustion rises in the outer walls of the setting, combining insulation with regeneration, and, passing through the walls of the combustion chambers, is heated to the temperature of ignition. The temperatures throughout the setting can be readily distributed over the length of the retorts to suit the class of coal being carbonized.

The retorts are elliptical in cross-section, having thus a natural rigidity from the arch-like shape of the retort walls, so that no stays are required and the whole superficial area of the sides of the retorts is in immediate contact with the flames of combustion. The ends of the retorts in the plan being in the form of curves continuous with those of the sides, there are no sharp corners across which the charge might "bridge" or arch over, and the coal passes evenly down the retort without sticking or hanging up.

The built-in producers for the generation of fuel gas for the settings are of the latest improved step-grate type, open to the atmosphere. The ingress of primary air is controlled solely by the demands of the setting. The producer is open to inspection at all times, and there is no clinkering in the usual sense of the word; it is merely necessary to keep the fire reasonably clean.

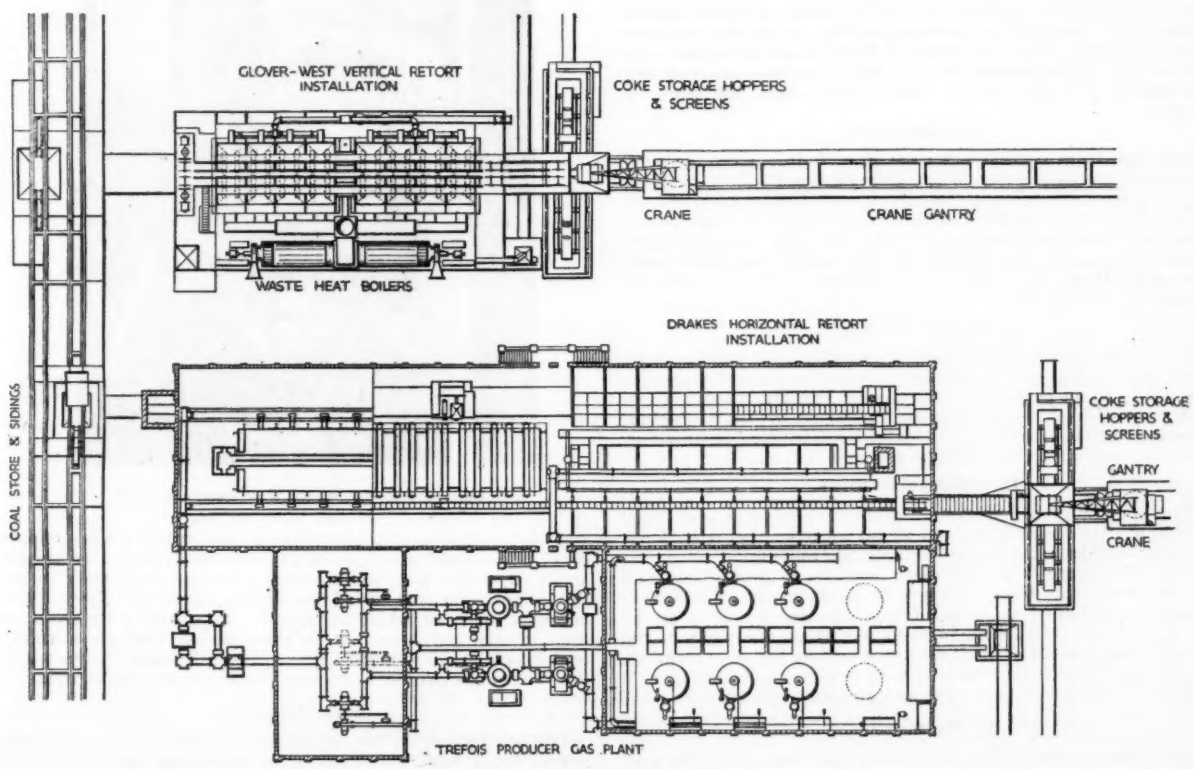
The settings are supported clear of the ground on a steel girder floor carried upon heavy steel main stanchions, and the brickwork of the setting is braced by steel buckstays, horizontal bracing, and top cross ties, making a complete steel structure with suitable allowances for expansion. The lines of buckstays are continued upwards to form supports for the steel coal-storage bunkers above the retort benches, with a total capacity of 580 tons of coal, or about 48 hours' supply to the retorts. Coke for the supply of the producers, and for the preliminary filling of the retorts after stoppage, is contained in steel hoppers with runways and skips for transport.

Retorts.

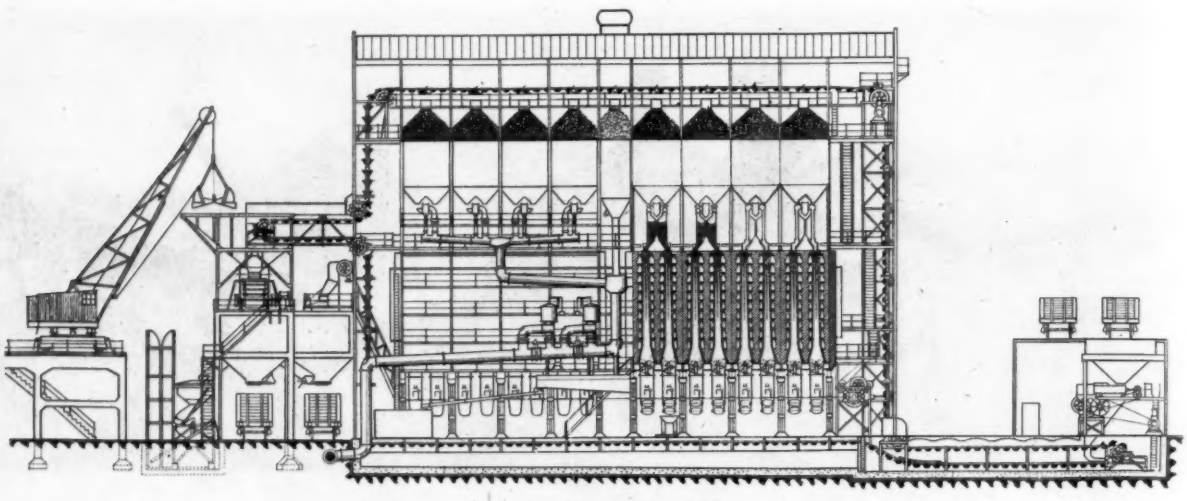
The retorts measure 40 in. by 10 in. at the top, with a continuous taper to within about 4 ft. of the bottom, where they are enlarged to the steaming chamber, the whole being 25 ft. long. The linings of the combustion chambers and the whole of the retorts within the heating zone are built in Derbyshire silica, the outer walls of the setting and the tops and bottoms of the retorts being constructed of suitable fireclay materials.

Waste-Heat Recovery.

The waste gases from the settings are collected in a main flue constructed of steel plates lined with one course of firebrick and one course of "Dome" insulating bricks. Exits from the



PLAN OF CARBONIZING PLANT.



THE GLOVER-WEST VERTICAL RETORTS.

main flue lead either to a chimney of 5 ft. inside diameter, constructed in steel plate with a lining of firebrick, or to the waste-heat recovery plant.

This consists of two Spencer-Bonecourt horizontal, fire-tube, induced-draught boilers with superheaters, each capable of evaporating 16,000 lbs. of water per hour from and at 212° Fahr., and generating steam at a pressure of 120 lbs. per sq. in. and a temperature of 400° Fahr. In addition to the usual high-grade boiler fittings, each boiler is fitted with automatic feed-water regulator of the "Thermofeed" type, supplied by Messrs. Ronald Trist, and with an automatic "Hilo" water-level alarm, by means of which a shrill whistle is sounded if ever the water level in the boilers should vary beyond the predetermined limits.

The induced-draught fans are of the "Sirocco" type, actuated by an electric motor capable of developing 110 H.P. Each fan unit is designed for a 20 p.ct. continuously rated volumetric overload over and above the normal calculated volume of gases passing through the boiler, due allowance being made for the increased water gauge at such overload. The dampers for controlling the passage of waste gases to the boilers and chimneys have been very carefully studied and designed, and represent the latest improvements in this direction.

The boilers are inter-connected with the breeze-fired boilers and the works supply with a surplus valve to maintain a suitable pressure within the retort house. Steam supply to the retorts is controlled by reducing valves, and each retort is fitted with a West-Taylor regulating valve, by means of which steam is distributed among the retorts according to the requirements of gas making. The whole of the boiler and steam lines are heavily lagged to prevent loss of heat by radiation, and the installation is fully equipped with temperature and pressure gauges.

Gas Offtakes.

The gas from each retort rises in a 10-in. ascension pipe, controlled and isolated by a specially designed gas valve leading to a steel gas collecting main to each setting of eight retorts. Each main is fitted with a 14-in. foul gas valve and a 6-in. tar flush valve leading to 18-in. diameter foul-gas mains uniting in a 24-in. down-comer to a common 30-in. main with two 24-in. Braddock retort house governors with tar bosh and circulating equipment.

Retort House.

The vertical retorts are housed in a steel-framed building with brick panels, and fully equipped with platforms and staircases leading to all parts of the plant. An electric lift, manufactured and supplied by Messrs. Etchells, Congdons, & Muir, of Manchester, capable of raising a net load of one ton, is provided, with connections to all floors of the installation.

Horizontal Retorts.

The installation of horizontal retorts consists of 18 beds, each containing ten through retorts, 24 in. by 18 in. by 23 ft. long, designed and built by Messrs. Drakes, of Halifax.

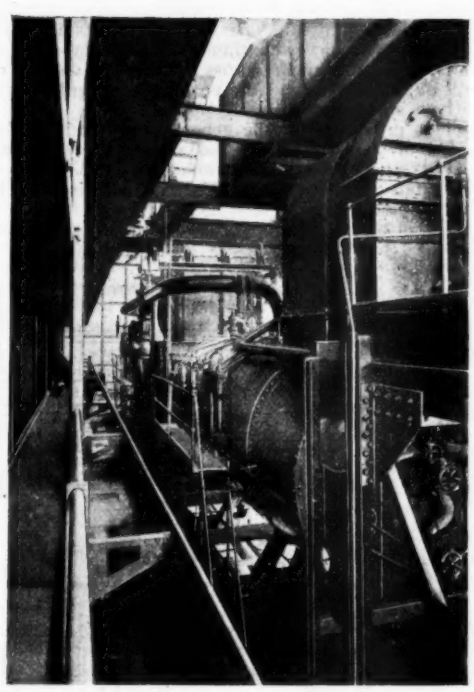
The 18 beds are arranged in two benches, each of 9 beds, and having a separate brick chimney for each bench. The installation is contained in a stell-framed house 277 ft. long by 65 ft. wide by 42 ft. 6 in. high to the eaves, the walls of the house being formed of brick filling carried by the steel framing, all the steel work being covered with brickwork, which gives a house of substantial character and pleasing appearance.

Retorts.

The retorts, which are constructed of Meltham silica segments, are charged and discharged by means of two Drakes patent combined charging and discharging machines, both of which can charge and discharge absolutely full retorts. The plant is arranged to work two 12-hour charges with two 8-hour shifts of men. The retort settings, which allow for an ample margin of solid, soaking heat, ensure that full charges are thoroughly burnt off in twelve hours. Both the producer gas and the secondary air are heated by Drakes' patent tubular regenerators. The working temperatures are very flexible, and the adjustments are very simple, so that charges of any weight or duration of time may be efficiently worked according to the convenience and desire of the management.

Coal Handling.

Coal is delivered into the adjacent sidings, and the railway

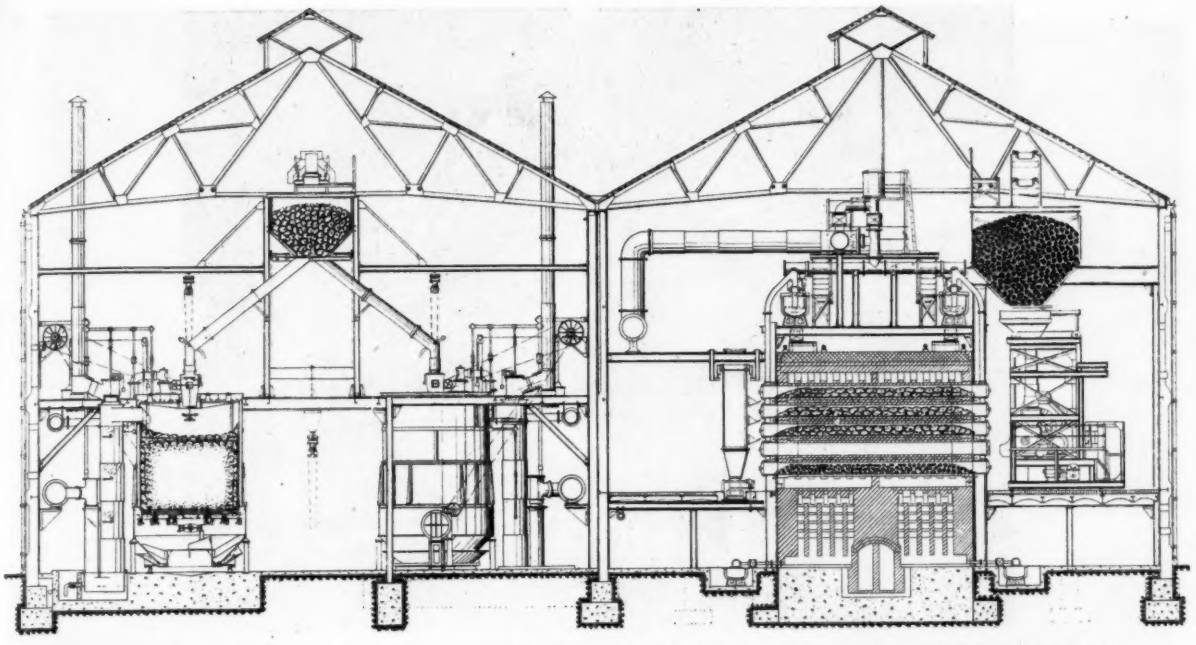


Vertical Retorts—Waste-Heat Recovery Plant.

wagons are discharged direct into a mild-steel receiving hopper of 35 tons capacity by means of two ram-type wagon tippers arranged so that wagons can be tipped from either end. From this hopper the coal is fed by rigging trays to either of two breakers, each of which is capable of dealing with about 60 tons of coal per hour. It is then passed through a rotary feeder to a gravity-bucket conveyor, which takes it forward to the continuous overhead storage hoppers in the retort house.

Coke Handling.

The hot coke from the retorts is received by a hot-coke conveyor, fitted with automatic coke quenching apparatus, and discharged into a receiving hopper from which the coke is



A CROSS SECTION THROUGH THE DRAKES HORIZONTAL RETORT HOUSE AND THE TREFOIS PRODUCER PLANT.

elevated by an automatic, electrically-operated skip hoist, which discharges into another receiving hopper, which, in turn, feeds it to a series of mechanical screens erected over a set of reinforced concrete hoppers, which provide coke storage for graded coke and breeze. The receiving hopper at the head of the hoist is also arranged to receive coke from the yard stock by means of the grab on the travelling crane.

Trefois Producers.

The producer gas plant consists of six patent "Trefois" mechanical breeze-burning producers, complete with cleansing and exhausting plant. Provision has been made for a further extension of two more producers and another set of exhauster blowers.

Each producer is capable of gasifying 12 tons of coke breeze per diem, but, by means of a governing device on each producer, the blast can be automatically controlled so that the throughput can readily be varied to suit any fluctuation in the demand for producer gas. The mechanical grates permit of the successful gasification of a mixture of coke breeze consisting of 50 p.ct. $\frac{3}{4}$ in. to $\frac{3}{8}$in., and 50 p.ct. $\frac{3}{8}$ in. to dust, the breeze being fed into the producer through a patent mechanical feeder and distributor fixed in the centre of the producer cover. The distributor is arranged so that, when it is rotated, the fuel can be evenly distributed over the whole area of the fuel bed. The drive is taken from a line shaft by means of pulleys, belts, and worm gearing, each producer being supplied with separate belt-shifting gears.

The producers are water-jacketted, which eliminates the need for any refractory lining, and the air necessary for combustion is passed over the hot water in the jackets through a series of baffles, where is becomes saturated with hot water vapour. It is then passed to the under-side of the producer grates, and effectively prevents the formation of clinker. The producer is self-cleaning, and the ashes are taken away in a tipping wagon running on an overhead track.

The producers are arranged for convenience in two units, each unit being complete with its own ancillary plant. To ensure a gas free from dust and possible tarry vapours, the producer gas is efficiently cleansed by being successively passed through vertical mild steel washers, vertical coke-filled scrubbers, and specially designed Livesey washers, before it reaches the exhausters.

From the outlets on the exhausters, the gas is collected into one common main, and passed through a mild steel box containing a water seal, so that, if an explosive mixture occurs in the mains at the furnaces, this seal will prevent any flame travelling back to the producers themselves. The gas is finally passed through a drier constructed of specially designed perforated plates, whereby any excess moisture is removed. The construction of the drier is such that there is no necessity for changing the drying medium. Any deposit at this point may be removed from the bottom of the casing. These producers were constructed and supplied under the Trefois patents by Messrs. Drakes.

Gas intakes to both sides of the retort settings are taken from a line of mild steel gas mains running along each side of the bench. These intakes are all fitted with isolating valves. The producer and exhauster plants are housed in separate steel-framed brick-filled houses, that for the producers being 120 ft. long by 65 ft. wide, designed to conform with the appearance of the main retort house building. The exhauster house is 75 ft. long by 48 ft. wide, the walls being covered with glazed tiles, and the floor laid with terra-cotta tiles. All the buildings are roofed over with mild steel principals—slates being laid on steel purlins filled with timber slats.

The blast for the producers is supplied by blowers, which are of similar construction to the exhausters, each set of exhausters and blowers being driven from a common shaft by means of a 65 H.P. motor with pulleys and belts. A mild-steel stage floor is arranged around the tops of the producers, providing convenient facilities for inspection and attention to the fuel beds and feeding arrangements. Breeze for the producers is brought to the plant in railway wagons, which empty into a receiving hopper. Duplicate continuous bucket elevators take the breeze from the hopper, and deposit it on to a band conveyor running the full length of the producer house; and, by means of the tipping carriage, the breeze is transferred into the overhead storage hoppers, whence mild-steel shoots feed it to the mechanical feeders on the top of the producer.

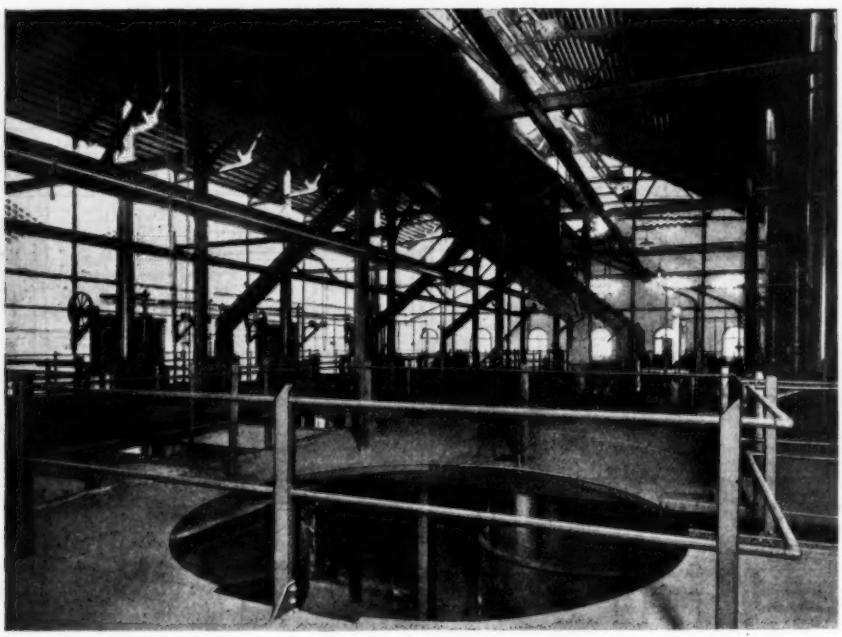
Water for the plant is fed from a cast-iron storage tank in the roof of the producer house. The whole of the drainage water is collected in a concrete sump outside the house, and, after being sieved, the clear water is pumped back into the storage tank. Arrangements are also made whereby town's water can be used on any part of the plant in place of the circulated water.

Coke Storage.

Coke from each retort house is discharged, in the case of the vertical retorts, from the West lip-bucket conveyors encircling the retort bench, and in the case of the horizontal retorts, from the Drakes skip hoist, into a series of mechanical screens of Drakes' patent Cascade type, arranged above the reinforced concrete hoppers, each with a capacity of 150 tons of graded coke, in five compartments. The hoppers are supported on reinforced concrete columns monolithic with the hoppers, and arranged to allow of the passage of railway wagons beneath. Each hopper is provided with a surplus coke compartment leading to a West patent automatic skip filler. These machines are actuated by the weight of the empty coke skip descending to be filled and by the weight of a counter balance when the full skip is ready to be elevated by the crane, so that the crane operator can receive the load of coke without leaving the crane platform.

Extending from the end of each retort house there is a reinforced concrete gantry with a rail level 20 ft. above the coke yard, 300 ft. long in the case of the vertical retort house and 200 ft. long in that of the horizontal retort house, giving 3000 to 2000 tons storage capacity respectively. Both the gantries and the hoppers were designed and constructed by the Fram Reinforced Concrete Company.

Upon each gantry there is a Stothert & Pitt electric crane with hoisting, slewing, and travelling motions, designed to handle a load of 4 tons when operated on a fixed radius of 30 ft. The gauge of the crane rails is 10 ft. and the wheel base 10 ft. Each crane is operated with two motors, one for hoisting and travelling, and one for the slewing motion. The operators' cabins are of substantial design, weather-proof, with adequate windows and a door giving access to the motors and driving gear. For reclaiming the coke from the yard store,



TREFOIS PRODUCERS—CHARGING STAGE.

each crane is provided with a Priestman grab of about one ton capacity, operated from the crane cabin. Safety limit switches are provided at the end of each gantry to prevent over-running.

The Semi-Direct Ammonia Recovery Plant.

The gas leaving the retort houses is carried across the coke yard below ground level in two separate mains, and enters the bye-product plant adjacent to the main works roadway.

The semi-direct ammonia recovery plant is an important new development in gas-works practice. The whole of the work from the foul main to the inlet purifiers was placed, in one contract, with Messrs. W. C. Holmes and Company, of Huddersfield. Part of this contract included the provision of the foundations and buildings, as well as the preparation of the site, and this work was placed by them with the F.C. Construction Company, of Derby, who sub-let the work to the Fram Reinforced Concrete Company.

In brief, this process consists in passing the crude gas, after cooling and removal of tar fog, through a sulphuric acid bath in a saturator of special type. The installation includes the following apparatus:

1. Primary coolers.
2. Tar extractors.
3. Exhausters.
4. Crude gas meters.
5. Saturators.
6. Final coolers.

In addition to these there are ammonia stills in which the virgin liquor is distilled, and the ammonia is returned to the gas prior to the saturator inlet.

Further Details of the Plant.

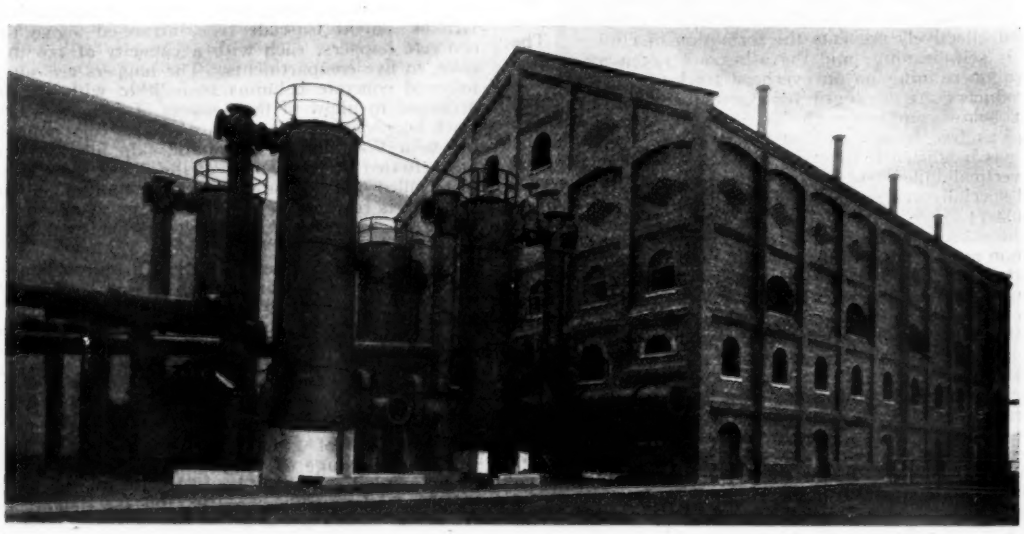
Primary Coolers.—The two streams of gas are kept separate until they have passed through to the meters. There are, therefore, two sets of primary coolers, one being on the stream from the Glover-West vertical retorts, and the other for the gas from the Drakes horizontal retorts. Each set consists of three Holmes "Super-Type" water-cooled condensers, and is rated for 5 million c.ft. of gas per day.

Tar Extractors.—Three Holmes columnless P. & A. tar ex-extractors are employed, one being used on each stream and one for standby. A special framework is provided for handling the drums when required.

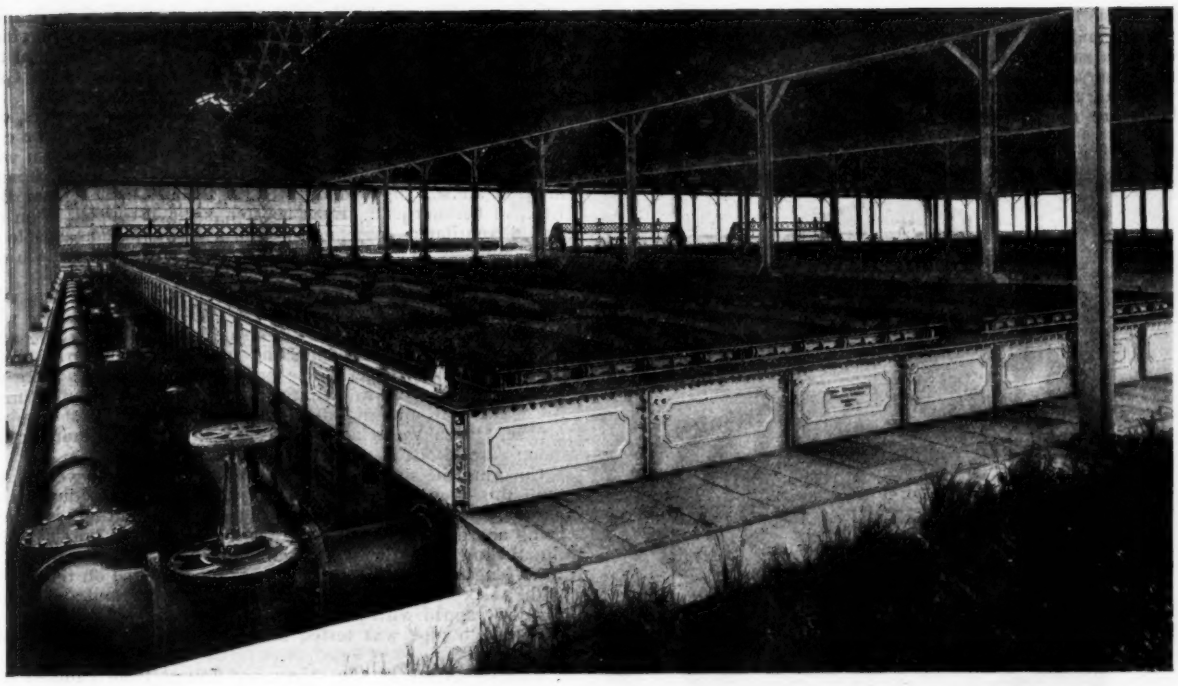
Exhausting Plant.—This comprises three Bryan-Donkin Rateau turbo-exhausters, each of 5 million c.ft. daily capacity. They are of the three-stage type and are driven by Brotherhood steam turbines on the same bedplate. Governing is effected by throttle control operated by a governor bell in communication with the inlet gas main to the exhauster. Safety governors are also provided. The exhausters run at speeds up to 4000 R.P.M.

The steam exhausted is passed into the ammonia liquor stills and other parts of the plant requiring low-pressure steam.

Crude Gas Meters.—Each stream of gas is metered, before being mixed, by a "Rotary" meter, supplied by Messrs. W. & B. Cowan, of Manchester. These meters are placed in the exhauster house. In this house are also the air compressors, which furnish the power for circulation from the



THE TREFOIS PRODUCER PLANT.



PURIFIERS.

saturators, handling acid, and certain minor uses. The compressors are of the reciprocating type, built by the Bryan Donkin Company.

A set of four Mather & Platt motor-driven centrifugal pumps are also placed in this house. These supply ammonia liquor to the liquor stills and to the sprays provided on the final coolers.

The recording and indicating thermometers, pressure gauges, and so forth, are also placed in the exhauster house.

Saturators.—In the sulphate house are three semi-direct saturators, two capable of handling 10 million c.ft. of gas daily, ane one of half this capacity for dealing with reduced makes of gas. They are of steel plates, lined with, chiefly, 30 lb. lead. The gas passes through the acid therein, being distributed by solid lead cracker pipes. An air-lift ejects the sulphate as formed to the draining table, from which it is at intervals transferred to one of two motor-driven centrifuges. After neutralizing, it is conveyed to one of two air-heated sulphate dryers. The dry neutral salt is lastly elevated to a system of storage bunkers.

The leadwork throughout was carried out by Messrs. Joseph Taylor Limited, of Bolton, to the designs of Messrs. W. C. Holmes & Co. The centrifugal machines are by Messrs. Thos. Broadbent, of Huddersfield. The construction of the bunkers for the finished sulphate is of interest.

Final Coolers.—These are a set of three Holmes " Super-Type " condensers of the same size as the primary condensers. Leaving these the gas passes to the purifiers.

Tar and Liquor.—All condensates and drains from seal pots run to an underground collecting tank of concrete placed between the primary coolers. They are pumped to an over-head tank, where separation of the tar and liquor takes place, and the latter are run to their respective storage tanks.

Liquor Stills.—There are two Holmes ammonia stills, either being capable of the full duty demanded. The ammonia-steam mixture passes into the crude gas, and the waste liquors are passed out to be cooled.

Dry Purification.

After the removal of ammonia and tar from the gas, it is passed through 24-in. mains to the north-east side of the railway, where the dry purification plant and gasholders are situated. There are four sets of purifiers, each containing five boxes—that is, twenty in all—40 ft. square by 6 ft. deep, each box being provided with six covers of the luteless type, the joints being made by wing bolts securing the covers against rubber strips. The covers are raised and carried in pairs by Hovey cranes. Each box accommodates three tiers of oxide, by means of which the hydrogen sulphide is entirely removed from the gas. The connections are 24 in. diameter, fitted with double disc valves and auxiliary double-faced slide valves, provision being made in the former type for the disc to be ground upon the seating in opening or closing.

The tops of the purifiers are about 2 ft. 6 in. above the ground level, and between each set there is a floor 55 ft. wide upon which the foul oxide is exposed to the air for revivification. The boxes are filled and discharged by means of a portable elevator and conveyor, and a disintegrator is provided for breaking any lumps which may be formed in the oxide. The whole area occupied by the purifiers and revivifying floors is covered by roofing with open sides.

Two sets of the purifiers were supplied and erected by Messrs. R. & J. Dempster, of Manchester, and two sets by Messrs. Newton, Chambers, & Co., of Sheffield. The roofing with steel structural supports was erected by Messrs. Joseph Parks & Son, of Northwich. This roofing covers an area of nearly 1¾ acres, 330 ft. wide by 210 ft. long. It is constructed in six bays each of 54 ft. 8 in. span. The roof covering consists of Velinheli slates secured to timber filling in steel angle purlins by means of copper nails. This slating was carried out by Messrs. W. Royle & Co., of Manchester.

Measurement.

From the dry purification plant the gas passes to a Holmes patent brush washer, where it is treated with gas-oil for the removal of naphthalene.

From the naphthalene washer, it passes through the station meter, where the quantity of the whole of the gas produced in the works is registered on a chart, which also records the variations in temperature and pressure throughout the twenty-four hours. This meter is of the " Connersville " positive displacement type, built by Messrs. W. C. Holmes & Co., of Huddersfield. and has a normal capacity of 8 million c.ft. of gas per diem, and is capable of an overload of 100 p.ct. without loss of accuracy.

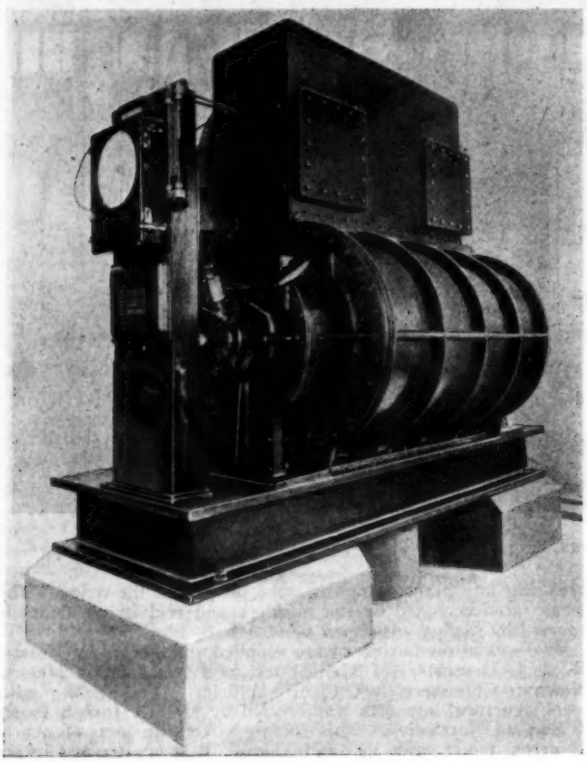
The construction of the meter is similar to that of the well-known exhausters and compressors of the " Connersville " design. The two rotors contained within the cast-iron casing are caused to revolve by the pressure of the gas, and the cavities constituting the measuring chambers, which are of known and unvarying capacity, are completely occupied each revolution alternately by the gas and by the solid metal of the rotors. The rotor shafts are carried in roller bearings housed externally to the casing, and are easily accessible to inspection without dismantling the meter. The differential pressure thrown by the meters is quite nominal (less than ¾ in. at maximum capacity), and the accuracy of registration is guaranteed by the makers to be within 1 p.ct. of the theoretical figure.

One of the outstanding advantages of this type of meter is the extremely small floor space required; in this case it is only 5 ft. by 9 ft. 6 in., and the total height is only 7 ft. 5 in. Recording instruments are provided as part of the meter equipment, showing, on one chart, the variations of temperature, pressure, and gas make throughout the twenty-four hours. Both these pieces of apparatus are contained in the building adjacent to the gasholder.

Storage.

Gasholder.—The contract for the spirally-guided gasholder in a steel tank was placed in the hands of Messrs. R. & J. Dempster, of Manchester. The gasholder has four lifts, the inner one being 200 ft. 3 in. diameter, the second 203 ft. 6 in. diameter, the third 206 ft. 9 in. diameter, and the outer lift 210 ft. 10 in. diameter by 40 ft. 6 in. deep. The steel tank is 212 ft. 6 in diameter by 41 ft. 6 in. deep. The inlet and outlet pipes are fixed upon opposite sides, and are 36 in. diameter

within the tank; outside the tank they are of rectangular formation, and are carried to the tank balcony level, so as to provide a safety seal. The gasholder throughout is fitted with the " Bearscot " specialities. The crown has a rise of 15 ft., and, with the exception of the heavy outer rows, the crown sheets are 10 ft. long. The supports for the crown comprise



The Holmes-Connersville Meter.

circular rows of bracket bars carried upon brackets secured to the joist iron stanchions, the foot of the latter resting upon the bottom of the tank. The dips are 2 ft. 6 in. deep by 12 in. wide and the upper ends of the vertical stays of the second, third, and fourth lifts are kneed at the top, and secured to the underside of the dip channels to maintain these level when carrying the weight of the following lifts. The lower ends of the vertical stays are formed into brackets, and secured to a circular plate $\frac{5}{8}$ in thick and 3 ft. wide, which forms a girder to stiffen the cup and maintain the shell in a true circle. On each of the lifts the heavy top row of side plating is extended 3 in. above the dip channels to prevent disfigurement of the painting by the drainings from the crown or dip channels.

To ensure a level surface for the guide rails on the exterior of the holder, a continuous plate extends between the upper and lower rows on each lift, where angular provision is made to receive the ends of this plate, so avoiding the use of liners, &c., at the cup and dip channels. The control carriages throughout are of the " Bearscot " four-roller, all-steel type, and are linked together on opposite sides of the guide to give double contact and smooth working. Handrailing is provided around the top curb and each dip, and access is assured when the holder is in any position by means of staircases carried on the dips and tank platform. A double-flight cast-iron staircase is carried from the ground level to the balcony around the tank. Safety stops are provided at the upper ends of the spiral rails, and each cup is fitted with a series of anti-freezers connected by means of flexible armoured hose to a main steam supply at the ground level.

The pressures thrown by the various lifts in inches are as follows:

Inner lift. . . .	5·3 in. ..	Second lift . . .	8·2 in.
Third lift . . .	11·0 ,, ..	Outer lift. . . .	13·7 ,,

The steel tank contains 41,000 tons of water, while the weight of the gasholder and steel tank together with the interior supports amounts to 2500 tons, so that the total weight upon the foundations is about 43,500 tons. When the gasholder is full, its height will be upwards of 208 ft. above the foundation level. The concrete foundations for the gasholder were carried out by Messrs. Monk & Co., of Irlam.

Supplying the City.

In general, the pressure thrown by the holder, coupled with the fact of the difference in level between the Partington site and the Gaythorn Station, will be sufficient to secure the transmission of the gas to the city without mechanical assistance, but under certain conditions this will be necessary. Therefore, a set of pressure boosters has been provided and installed at the entrance of the 36-in. main connecting Partington with Gaythorn.

Boosters.—There are two single-inlet turbo gas boosters, one as a stand-by to the other, each capable of passing 500,000 c.ft. of gas per hour through ten miles of 36-in. diameter main with a 6-in. inlet pressure and 12-in. terminal pressure when running at 3200 R.P.M., supplied by Messrs. Bryan Donkin Company, Ltd., of Chesterfield. Each booster is direct-coupled to an enclosed ventilated compound-wound electric motor capable of developing 25 to 75 H.P. at 1600 to 3000 R.P.M. on the 440-volt direct-current supply.

The boosters are equipped with a 36-in. loaded by-pass with ball bearings with 24-in. Holmes " Western " valves with columns and indicators and the usual recording instruments.

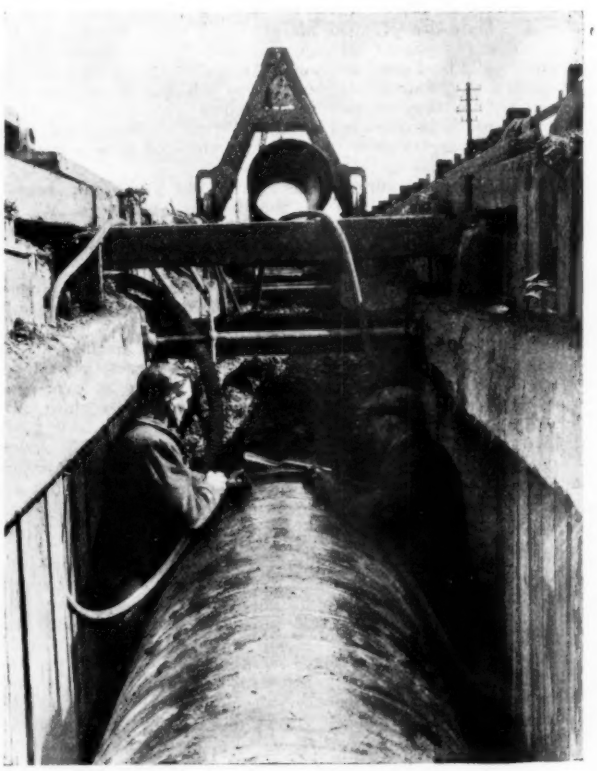
Mains.—The mains connecting up to the gas-works are of high-quality mild steel. The orders for these pipes were entrusted to the well-known firm of steel pipe manufacturers, the British Mannesmann Tube Company, Ltd., of Baldwin House, Queen Victoria Street, London, the actual manufacture being carried out at their works at Newport, Mon.

Covering the supply of these mains, six contracts were placed with this Company, the total length supplied exceeding 50,000 ft. and weighing nearly 5000 tons, the weight of each pipe being approximately $2\frac{1}{4}$ tons. These pipes have a bore of 36 in., the thickness of the walls being $\frac{1}{2}$ in. and the length 25 ft. Each length before leaving the works was coated on the outside with a special bituminous preservative compound, and afterwards wrapped with jute cloth soaked in the solution, prior to which each pipe was tested by hydraulic pressure to 200 lbs. per sq. in.

The joints are of the spigot and faucet type, caulked with lead wool and run lead, and each joint was tested after making to 80 lbs. per sq. in.

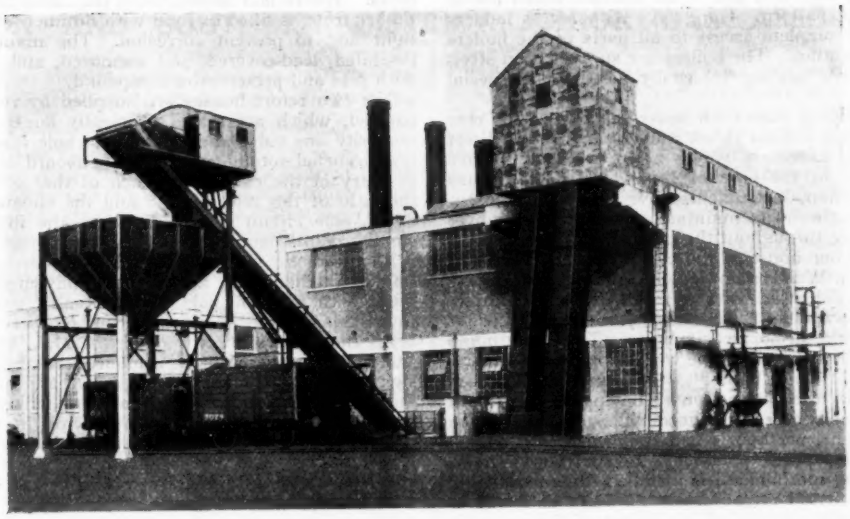
It is a significant fact that, in spite of the many problems which had to be solved in the course of laying, this main has shown itself, under test, to be free from leaks of any kind; in fact, it can be safely claimed that it is " bottle " tight throughout its length, a striking tribute to the quality of the pipes and the skill and thoroughness with which the joints were made.

The laying of the main commenced at the Gaythorn Station, and a devious route was followed through Hulme to avoid excavating any main roads, emerging from the city boundary in King's Road, where it is carried over the Cheshire Lines



The 36-Inch Main from Partington to the City.

Railway. It is carried over the Manchester and Altrincham line and over the Bridgewater Canal at Stretford. It then runs parallel to the Cheshire Lines Railway through Urmston and Flixton, crossing the railway twice, and forward south-west over the River Mersey near Carrington to the works This last section gave rise to a special problem, since the ground is



THE POWER HOUSE.

of a peaty nature, and special protection had to be given to the pipes.

BUILDINGS AND WORKS EQUIPMENT.

The principal buildings of the works are constructed generally with a reinforced concrete framework, with Accrington brick panels and steel windows, and with floors, flat roofs, and staircases in reinforced concrete. The members of the concrete framework are brought forward in the design, forming a contrasting feature against the brickwork, the concrete being rubbed down and finished to a smooth face.

Administration Building.—The office buildings are placed at the entrance of the works. They are constructed in two storeys covering an area of 125 sq. yds. The rooms are large and lofty and particularly well lighted. The floors are finished with terrazzo and jointless flooring. The woodwork in the main office is polished mahogany, the remainder being Oregon pine. The chemical laboratory, which is fully equipped with all necessary instruments and fittings for the scientific control of production, is situated on the upper floor, access to which is obtained by a broad concrete stairway cased in terrazzo. The building is centrally heated from a coke-fired boiler through hot water pipes and radiators.

Communications.—Obviously in so large a works operated at a distance from the head office in Manchester, communications demanded special and careful treatment. An automatic private branch exchange has been installed by the General Post Office. Two facilities are offered by this equipment: not only are calls from the Public Telephone Exchange capable of being extended to any of the telephone sets on the premises, but a complete system of intercommunication between the various departments is available, without the necessity for separate telephone sets. Each telephone, by the simple process of dialling, can get in touch with any other telephone in the organization. For internal calls the system is entirely automatic in operation. An operator is necessary only for calls incoming or outgoing on the exchange line. Associated with the automatic unit is an attendant's cabinet which enables the operator to transfer calls from Irlam Main Exchange to the wanted telephone line. So far as the users of the telephone system are concerned, calls on the exchange line are made as simply as in the case of internal communication. By dialling "O" the operator's attention is attracted, and the required number can be passed on to her, so that the actual call is obtained by the operator at the attendant's cabinet. This system is designed to give the users the minimum of trouble. The equipment at present installed comprises twenty extension lines, but is designed to be capable of taking care of thirty lines at a later date.

Mess Room.—Immediately opposite the offices is the accommodation for the men. It consists of a lofty mess room 60 ft. by 45 ft., with kitchen and lavatories adjoining. Here meals are cooked and food heated and served to the men as required. A large platform is provided in the mess room for lecture and entertainment uses.

Workshops and Stores.—This building covers a ground area 120 ft. by 112 ft., and is constructed in two bays, with concrete columns supporting rails for overhead travelling cranes. The workshop is equipped with machine tools, benches, and appliances for all the running repairs of the works and plant. The building is lofty and well lighted; the floors are covered with soft wood blocks set with the grain vertical. The stores are fitted with steel removable trays on the "Tiltrack" system manufactured by Messrs. Bertram Thomas, of Manchester. Adjustable steel shelving by the same firm has also been installed.

Chemical Plant Building.—The ammonia recovery plant, exhausters, and crude-gas meters are housed in a finely designed building in which the concrete fabric has been utilized to give a very pleasing architectural effect. It covers an area of 26,400 sq. ft. Heavy foundations were required at this point owing to the soft nature of the ground; and the work includes two large underground tanks, one for the tar and liquor and the other for the storage of the acid used in ammonia recovery. Outside this building are the tar tanks and coolers, all constructed upon reinforced concrete foundations.

Power House.—The works boilers, power plant, and pumps are contained in another handsome building of similar design. In the construction is included an elevated concrete water tank of 50,000 galls. capacity for the storage of boiler-feed water, and a reinforced concrete coal hopper of 300 tons capacity. The power house floor is finished with terrazzo, and the walls are tiled to dado height with glazed tiles. Heavy foundations for the boilers and power plant had to be provided on this site.

The whole of this work was entrusted to the Fram Reinforced Concrete Company, of Manchester.

Entrance and Weighbridge.—At the main entrance from Broadway, a 20-ton weighbridge was installed by Messrs. Wm. Hodgson & Sons, of Salford. This machine is of the latest type, with platform 18 ft. long by 8 ft. wide, designed and constructed to accommodate heavy modern road traffic. The steelyard is arranged for printing tickets at the time of weighing.

Power Plant and Steam Supply.—Steam required for the generation of power and for certain of the manufacturing processes is generated in two ways on a modern gas-works—*i.e.*, either by the utilization of waste or surplus heat, or by the utilization of low-grade fuel. Both these methods are in use at Partington. The waste-heat recovery plant in connection with the carbonizing apparatus has already been described.

Boilers for the consumption of coke breeze have been supplied to the design of the Stirling Boiler Company, of London. This equipment consists of three Stirling five-drum type water-tube boilers, each having 4026 sq. ft. of heating surface, and each capable of evaporating 15,000 lbs. of water per hour at a working pressure of 160 lbs. per sq. in., with "Underfeed" travelling grate stokers, each being 8 ft. 6 in. wide by 14 ft. 4½ in. long, giving a total grate area of 122 sq. ft., burning gas-works coke breeze of 9000 B.Th.U. heat value. This fuel, being of a very low-grade character, necessitated the installation of a specially designed furnace and arch arrangement.

The boilers are equipped with forced and induced draught plant; the three forced draught fans being attached to the stokers, and the induced draught plant consisting of three 35-in. diameter fans of the "Sirocco" type, capable of receiving 26,000 c.ft. of flue gas at 600° Fahr. per minute, and discharging into chimneys 4 ft. in diameter by 60 ft. high. These induced draught fans are driven from electric motors by Westinghouse rocker chain drives, the motors being pipe ventilated of the shunt wound type, and operated by the Brookhirst drum type control panel.

The coke breeze is delivered by a special breeze elevating and conveying plant discharging into bunkers, and thence through cast-iron chutes to the stoker hoppers. The ash is removed from the ash hoppers by a "Duplex" ash conveyor, which is a continuous drag-link chain travelling the whole width of the boiler house, and discharging into a hopper situated over the railway lines; and, by the operating of a valve, the ash is allowed to drop into trucks.

The boiler mountings are of the Hopkinson type, with the exception of the automatic feed-water regulator, which is of the "Thermofeed" type, manufactured by Messrs. Ronald

Trist & Co., and the high and low water alarms, which are of the Probert & Bridge pattern. Gangways with access ladders are supplied, giving complete access to all parts of the boilers for cleaning and operation. The boilers are supported on steel-work in a brickwork setting internally lined with special firebricks.

The main steam piping from each boiler is taken to the rear of the boiler house into a main steam range, which leads direct to the power house; necessary valves being provided to give alternative operation in the case of breakdown. At various points of the installation, instruments have been placed to enable the operating engineers to maintain close supervision over the conditions existing throughout the plant.

Annexed to the boiler house is the pump house, where two feed pumps of Messrs. Weir's manufacture are installed. These pumps are 9 in. in diameter, with a 12-in. diameter cylinder and a 24-in. stroke, capable of delivering 7000 galls. of water per hour at 12 double strokes per minute. Two feed pump governors of the "Thermofeed" type were supplied by Messrs. Ronald Trist & Co. One Weir "Multiflow" surface feed heater is included in the pump house, having a surface of 100 sq. ft. and capable of raising 7000 galls. of water from 60° Fahr. to 150° Fahr. per hour when supplied with 7000 lbs. exhaust steam at atmospheric pressure. A Lea recorder tank, fitted with integrating mechanism, is installed, thus permitting the checking of the actual measurement of water delivered to the plant. Most of the mechanical equipment of the works is electrically driven, power being generated in steam-driven dynamos supplied from the works boilers.

Two 250-kw. machines have been installed by the Electric Construction Company, of Wolverhampton, and they are arranged to supply direct current at 440 volts. The machines are of the standard three-wire type, with slip rings for use with static balance to obtain the mid-wire connection, the balance being capable of dealing continuously with 25 p.ct. out-of-balance current in the middle wire, and of balancing the system, so that the voltage of either side shall not vary by more than 1 p.ct. from half the voltage across the outer wires.

The generators are direct-coupled to two Browett-Lindley vertical high-speed steam engines with forced lubrication. The engines are of the two-crank compound type with cylinders 15 in. and 22 in. diameter by 12 in. stroke. They run at a speed of 375 r.p.m., and are supplied with dry steam at a pressure of 150 lbs. per sq. in., exhausting against a back pressure of 10 to 15 lbs. per sq. in. The engines have an ample margin above the requirements of the dynamos. They are provided with powerful and very sensitive governors acting direct on the equilibrium throttle valve, which controls the speed within very fine limits.

Switchboard and Electrical Equipment.—The electrical plant installed throughout the works is very extensive, practically all the machinery, from small pumps to the powerful cranes, being driven electrically. The distribution of electricity over so large an area, and to such varied plant, involved the installation of equipment of a very comprehensive character. This work, from the main switchboard in the power house to the terminals of the motors, was entrusted to Messrs. Bertram Thomas, Ltd., of Manchester.

The main switchboard consists of ten enamelled slate panels mounted on a steel angle framework, with expanded metal doors at the ends, the whole erection being 22 ft. long by 7 ft. 6 in. high. The two generator panels are each fitted with double pole over-load and reverse current circuit breakers, equalizer, mid-wire switch, ammeter, voltmeter, and watt-hour meter. The seven feeder panels are each fitted with two double-pole circuit breakers, double-pole switches, neutral links, ammeters, and watt-hour meters. The tenth panel is arranged for the earth connection.

Owing to the nature of the ground it was deemed advisable to keep the cables above ground as far as possible. They are carried on heavy galvanized iron saddles fixed to creosoted oak posts. Where laid underground the cables are laid in creosoted timber troughs filled in solid with bitumen to keep them water-tight and to prevent corrosion. The main cables are paper insulated, lead-covered, and armoured, and are covered overall with jute and preservative compound.

The two retort houses are supplied by two 3-core cables in parallel, which are made sufficiently large so that in case of necessity one cable can carry the whole load. A special unit-type ironclad totally-enclosed switchboard is fixed at the point of entry of the cables into each of the several buildings. In the case of the retort house and the chemical plant, ironclad double-pole circuit breakers protect the installations. In the smaller plants double-pole switches and fuses are employed.

All the motor starters are of Messrs. Bertram Thomas' well-known ratchet type, all of the totally-enclosed pattern, each fitted with a double-pole circuit breaker and an ammeter, so that the load on every machine can be observed at all times.

All the motors are wired with C.M.A. 2500 megohm grade V.I.R. lead-covered and armoured cables, which enter the switchboard and motors through lead and armour glands, thus making a thoroughly first-rate insulated and water-tight installation. The motors are generally of the well-known totally-enclosed internal ventilated type manufactured by Messrs. Electromotors, Ltd., of Manchester. Each generator is provided with a static transformer to give 220 volts to the middle wire for lighting purposes.

Works' Railway.—The works' railway was laid by Messrs. A. Monk & Co., of Irlam. Two locomotives have been provided, one by Messrs. Peckett & Sons, of Bristol, the other by Messrs. The Avonside Engine Company, of the same town. Both are of the saddle tank type, and each is capable of hauling about 600 tons on the level.

Dwelling Houses.—Housing accommodation for part of the personnel of the new works has been provided on the roadway leading from the main road to the works entrance. Thirty-one new houses have been built, comprising one fully detached house for the Manager, six houses of the parlour type for the foremen, containing three bedrooms, bathroom, &c., and twenty-four workmen's houses of the non-parlour type with three bedrooms, bathroom, &c.

This work, together with the brick-filling of the horizontal retort house, producer house, exhauster house, and much new road work, footpaths, and the concrete raft forming the yard coke store, was entrusted to Messrs. G. & J. Seddon, of Little Hulton.

Drainage.—The sewage disposal plant was constructed by Messrs. Wm. Bailey & Co., of Manchester. From so low-lying a site it presented something of a problem. As there were no sewers available, it was necessary to instal a special disposal plant to deal with the sewage from the dwelling houses. It was arranged to raise the whole of the raw sewage to a higher level, and then to deal with it in tanks and filter beds by gravitation. The plant was so designed that it will treat the sewage from the houses now built, and from a further thirty houses by constructing another filter bed of the same size

Drains, manholes, rain-water traps, and gulleys for the main works' drainage were supplied and fixed by Messrs. Etheridge & Leach, of Manchester.

Conclusion.

It will be seen from the foregoing that carbonization is carried out along two lines—viz., the continuous process in vertical retorts, and the intermittent process in horizontal retorts with stoking machinery. Fuel economy is obtained by the utilization of waste heat for the generation of steam, both for process purposes and for power-raising. The balance of the steam required is raised by the consumption of coke breeze, and the same fuel is used for heating the retorts by means of the outside producer plant, itself one of the largest of its kind in this country.

National Gas Council.—The Eleventh Annual General Meeting of the National Gas Council of Great Britain and Ireland is fixed to take place at the Hotel Metropole, Northumberland Avenue, on Tuesday afternoon next, May 14. The report and statement of accounts will be submitted by the President, Sir David Milne-Watson, LL.D., D.L.

Wales and Monmouthshire District Institution.—There will be a meeting of the Wales and Monmouthshire District Institution of Gas Engineers and Managers in the Lecture Theatre of the South Wales Institute of Engineers, Park Place, Cardiff, on Thursday, May 16, at 11 a.m., when the President, Mr. Frank Boardman, of Cardiff, will deliver his address, and a paper will be read by Mr. B. J. Bell, of Cardiff, on "Appliances and Service." The members and visitors will be entertained at luncheon by the Chairman and Directors of the Cardiff Gas Light and Coke Company in the Park Hotel, and subsequently there will be a visit to the Grangetown Gas-Works, under the guidance of Mr. Boardman and staff.

Midland Association of Gas Engineers and Managers.—The Spring Meeting of the Association will be held at Shrewsbury on Thursday, May 16, under the Presidency of Mr. C. M. D. Belton, who is Engineer, Manager, and Secretary of the Shrewsbury Gas Light Company. Inspection of the gas-works will be followed by a luncheon at the invitation of the Chairman and Directors of the Company; and in the afternoon the members will visit the "Sentinel" Wagon Works.

"Synthracite."—This is the name given to an artificial anthracite made by calcining common 2-in. anthracite ovoids in a special furnace. According to M. E. Gevers-Orban, Chief Engineer of the Charbonnages Espérance at Bonne-Fortune, at Montegnée-Liège, about 10 tons of this new smokeless fuel are made at his colliery in 24 hours. The finished product contains about 6 p.ct. of volatile matter, but this quantity can be reduced to 1½ p.ct., if desired. The ash content is 6·5 p.ct., and the temperature of ignition is about 400° C., or approximately midway between that of charcoal (250°) and of metallurgical coke (500°).

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

The Annual General Meeting of the Association was held on Friday, May 3, at the Westminster Technical Institute, Westminster, under the Presidency of Mr. W. T. KENSHOLE, of the Lea Bridge District Gas Company.

The PRESIDENT first of all referred to the death of Mr. Charles Hunt, M.Inst.C.E., who was a patron of the Association; and he asked the members to stand silent in their places, as a mark of respect to one who was a real friend and supporter of the Association.

Mr. T. D. MCSWEENEY, the Assistant Hon. Secretary, then read the minutes of the last annual meeting held on May 4, 1928, and reported in the "JOURNAL" for May 9, 1928, p. 382.

The next item was the presentation of the statement of accounts for the session, which, submitted by Mr. H. G. SOAR, the Hon. Treasurer, showed a credit balance of £161 5s. 6d.

On the motion of Mr. P. F. SCARTH, seconded by Mr. H. J. RISBY, the accounts were adopted.

The PRESIDENT then referred to the work of the Association during the 1928-29 session. With regard to membership, he said that this, at 349, showed an increase of 15; and as far as the programme of the session was concerned, he was sure that all would agree with him that a high standard had been maintained. Mr. Kenshole mentioned that the representatives on the District Education Committee—himself, Mr. Arthur Tennant, and Mr. T. H. Prater—had attended the meetings which had been held. The Committee were not entirely satisfied with the working of the Education Scheme of the Institution of Gas Engineers; and in collaboration with the Southern Association of Gas Engineers and Managers they had put forward a resolution to the Institution. [This resolution, by the way, is set out in this issue of the "JOURNAL" in our report of the half-yearly meeting of the Eastern Counties Gas Managers' Association.] As a result of this resolution, said Mr. Kenshole, the Institution had sent out a questionnaire to all the District Committees; and the replies were to be considered by the main Education Committee.

Another point to which he would refer was the Institution's decision to allocate the Bronze Medal to the member of any of the Junior Associations who presented the best paper during the session. With regard to the session 1928-29, the name of Mr. F. C. Smith, of the Gas Light and Coke Company, had been put forward by the Council of the London and Southern District Junior Gas Association, for his paper on "Some Aspects of Corrosion" (see "JOURNAL" for April 11, 1928, p. 118).

Then, said Mr. Kenshole, he had to announce with regret the resignation of Mr. T. D. McSweeney from the office of Assistant Hon. Secretary. The Association would be glad to hear that Mr. G. Gardiner, of the Wandsworth, Wimbledon, and Epsom District Gas Company, had consented to take on the duties of this office.

The President's report was adopted on the proposition of Mr. F. S. LARKIN (Senior Vice-President), seconded by Mr. SOAR.

At this stage in the proceedings, a vote of thanks to the Officers and Council of the Association was passed on the proposition of Mr. A. S. GOLDSPINK (Gas Light and Coke Company), seconded by Mr. W. A. HAZELDINE.

Mr. W. R. MOGER (Tottenham and District Gas Company) replied.

PRESENTATION TO PRESIDENT AND ASSISTANT HON. SECRETARY.

Mr. LARKIN proposed that a testimonial, in the form of an inscribed silver salver, be presented to the President as a mark of recognition of the services rendered during his year of office; and that a similar testimonial be presented to Mr. McSweeney.

The PRESIDENT and Mr. MCSWEENEY expressed their thanks.

OFFICERS FOR SESSION, 1929-30.

The PRESIDENT then announced the election of the following Officers for the session 1929-30:

President.—Mr. F. S. Larkin (Gas Light and Coke Company).

Senior Vice-President.—Mr. T. H. Prater (Isle of Thanet Gas Light Company).

Junior Vice-President.—Mr. J. H. Goldsmith (South Suburban Gas Company).

Hon. Secretary.—Mr. Arthur Tennant (East Surrey Gas Company).

Assistant Hon. Secretary.—Mr. G. Gardiner (Wandsworth, Wimbledon, and Epsom District Gas Company).

Hon. Treasurer.—Mr. H. G. Soar (Gas Light and Coke Company).

Hon. Auditor.—Mr. E. G. Merry (Gas Light and Coke Company).

Representatives on the District Education Committee.—Messrs. F. S. Larkin, T. H. Prater, J. H. Goldsmith, and Arthur Tennant.

Council.—Messrs. H. C. Sims, G. Gardiner, J. M. Webber, F. C. Smith, W. R. Moger, T. D. McSweeney, and Roy Summerson.

On the proposition of Mr. LEONARD LACEY (Gas Light and Coke Company), seconded by Mr. GOLDSMITH, it was agreed that a letter should be sent to Mr. J. Stuart Kerr, the Principal of the Westminster Technical Institute, thanking him for the support and the facilities which he had afforded the Association during the past session.

A vote of thanks to the Technical Press brought a most successful session to a close.

WESTERN JUNIOR GAS ASSOCIATION.

Annual Meeting: Visit to the Cheltenham Gas-Works.

On Saturday, April 27, a party of over forty members of the Association were welcomed at the works of the Cheltenham Gas Company by two Directors of the Company—Mr. Wyatt and Mr. Barnett. The tour of inspection which followed was greatly appreciated, special notice centering on the well-planned site and up-to-date working methods.

ANNUAL MEETING.

Following the tour of inspection, the annual meeting was held.

The PRESIDENT (Mr. T. B. Armitage) stated that the Council had elected Mr. B. F. Harris, of Trowbridge, as Junior Vice-President for the coming Session.

The Hon. Secretary (Mr. G. C. Gunston, of Bristol), the Hon. Treasurer (Mr. E. Evans, of Gloucester), and the Hon. Auditors (Messrs. J. F. Marlow, of Weston, and H. W. Randall, of Stroud) were re-elected, and were heartily thanked for their services; the PRESIDENT making special reference to the excellent work of the Hon. Secretary.

Three new Council Members were elected: Messrs. S. S. Lloyd (Weston), W. Barber (Cheltenham), and A. W. Cullington (Stroud).

SUMMER MEETING.

The PRESIDENT stated that an invitation had been received from Messrs R. & A. Main, Ltd., for the Association to hold their summer outing at their works.

It was unanimously decided to accept the invitation for the latter part of June.

Tea was provided by the Directors of the Cheltenham Gas Company, to whom a hearty vote of thanks was proposed by Mr. A. BARRETT (Frome), and carried with acclamation.

PRESIDENTIAL ADDRESS

of T. B. ARMITAGE, of Cheltenham.

We are now nearing the close of our third year as an Association, and, looking back, I feel that we can view our progress with a certain amount of pride. Our membership is now 87, and we have had an average attendance of 40 at our meetings, which, considering our scattered area, I think is very good, and speaks very well for the keenness of our members and the future of the Association.

We have to thank the various undertakings in our area for generous hospitality and facilities which have been granted to the Association for holding meetings and inspecting works. We realize that without this assistance our difficulties would be much greater.

We are also indebted to our hon. members for the continued interest they have taken in the work of the Association. In this connection, I should like to say how pleased we have been to add the name of Dr. Travers, F.R.S., to the list of hon. members. Dr. Travers, as most of you remember, addressed our Association in October, 1927, since when he has taken a lively interest in our activities; and we feel it a great honour that he has agreed to become an hon. member.

To-day, most of you have visited the works of the Cheltenham Gas Company for the first time, so perhaps a very few words on the history and progress of the Company may be of interest.

The Company was incorporated by Act of Parliament in 1819.

The age of the Company is, therefore, 110 years, which makes it among one of the 12 oldest undertakings in the Kingdom. Though we are up against keen electrical competition, we are still more than holding our own, and progressing steadily. The following will show the progress of the Company during the last 5 years:

In 1923 the gas sold amounted to 439,445,000 c.ft., and the total number of services was 14,695. In 1928 the gas sold was 545,048,000 c.ft. and the services numbered 15,331. You will see by these figures that our total gas sold has increased by 24 p.ct., while our consumption per service, which is most important, has increased by 18·88 p.ct.

As I am connected with the distribution and sales branches of the industry, my remarks will in the main be confined to that side.

Mains.

The extension and enlargement of mains is a problem that practically every undertaking has to face at some time or other; for, with the greater demand for gas and the developments of our various districts, often in quite an opposite direction to that anticipated, this problem is not always easy of solution.

Mains of to-day have to stand greatly increased strains compared with a few years ago, in addition to higher pressures. The choice of materials is, therefore, of the utmost importance, and the practically unbreakable nature of the steel tubes should certainly be considered before a decision is made.

Some of the advantages of steel tubes are the much greater lengths in which they may be obtained, the ease in handling

THE PRESIDENT,

T. B. Armitage, of Cheltenham.

Mr. Armitage was educated at the Heckmondwyke (Yorks.) Higher Grade School. From 1918 to 1924 he was Assistant Distribution Superintendent to the Swansea Gas Company, and in 1922 was elected first President of the Wales and Monmouthshire Junior Gas Association. He was appointed Distribution Superintendent to the Cheltenham Gas Company in 1925. He is an Associate Member of the Institution of Gas Engineers.

owing to their much lighter weight, and the greater strains that they will withstand. These strains, due to present-day traffic, make it necessary when using cast-iron pipes to lay the mains at much greater depths than in the case of steel. In addition to this, in cast iron there is a joint every 9 or 12 ft., whereas, with the use of the greater lengths of steel tube, there are far fewer joints; and it must be remembered that however well a joint is made, no joint at all is better. Even this can practically be attained with steel mains by the welding of joints, when a continuous steel tube can be obtained.

The strongest argument put forward in favour of cast iron is that pipes which have been in the ground for 50 to 100 years have been found to be in good condition, and the question is then put, Will steel stand the same test? It is, of course, difficult to answer a question of this kind, as steel tubes have not been in use for that length of time.

As steel mains have been in use in Cheltenham for many years, I had a short piece of the first steel main that was laid in the district cut out to see its general condition. This is not a special sample, but simply the oldest piece of steel main on the district, which I find was laid in March, 1908, and cut out on April 10, 1929. It has, therefore, been in the ground for 21 years, and it looks good for at least another 50 years. In fact, it is as good as the day it was laid.

In laying steel mains, however, the very keenest supervision must be exercised to see that the wrapping is absolutely intact, as the least negligence in this matter may very soon have serious results.

Services.

It is necessary for all services to be large enough to ensure that the consumer is able to obtain the peak load of his demand without an excessive drop in pressure.

In Cheltenham we have decided that the minimum size for services shall be 1 in. The cost of laying a service of 1 in. or 1¼ in. diameter varies but very little from the cost of ¾ in., the only difference being the cost of the tube, the labour charges being practically the same. The provision of ample service facilities not only improves the supply to the consumer, but makes provision for future appliances. This should always be considered. It is false economy to lay a service just large enough to supply immediate needs, for, should (say) a geyser be fixed at a future date, it will be found that the service requires replacing with a larger one.

Meters.

The accuracy and reliability of the meters on the district is, of course, of the very greatest importance, as the slow meter reacts against the Company by swelling the unaccounted-for gas figures, while, on the other hand, the fast meter may be quite as expensive in making a dissatisfied consumer, who is then ripe for our competitor's canvasser. Therefore, it is important that some system of periodical testing *in situ* be instituted. We have recently instituted such testing in Cheltenham; and though we are finding the vast majority of our meters are correct within the statutory limits, we have found quite a number correct at full capacity but not registering at 6 c.ft. per hour. This type of slow meter is very difficult to detect without a proper test.

The high-capacity meter, with its much greater capacity in proportion to the size of its case, is certainly growing in favour, and is a great advantage in premises where space is limited. It is, however, too early yet to say definitely whether it will oust the standard type of meter from general favour. It must be remembered when using the high-capacity meter that there is not the same latitude in the badged and actual capacity as in the old "lights" type, when a meter could often be worked at double its badged capacity, and still function correctly. I fear if anything of that kind is attempted with the high-capacity meter, in addition to an appreciable drop in pressure, incorrect registration is more than likely. It is, therefore, advisable to fix a meter badged to pass the full quantity that is likely at any time to be normally required.

Appliances.

In considering appliances, we must give full credit to the manufacturers for the continuous improvements that have been made in the design, appearance, and efficiency of the various types of apparatus. This is the result of work which is being carried out in the well-equipped laboratories which now form a part of most manufacturers' establishments.

It must, however, be pointed out that the manufacturers labour under the disadvantage of not coming in direct contact with the users of their appliances, and therefore it behoves the gas undertakings to keep the makers well informed of the actual experience of the consumers. This co-operation will, I can assure you, be welcomed by the manufacturers, and will assist in further improvements.

While on this question of appliances, I feel I must mention that we still see quite a number of shoddy appliances offered for sale and actually fixed on our various districts. This type of apparatus, which is not only inefficient, but at times positively dangerous, is very detrimental to the industry generally, and I cannot too strongly condemn the sale of such goods. So far as we as an industry are concerned, nothing but the best should be good enough.

We are told that this class of apparatus is usually only sold outside the industry, but I feel that if purchasers were not to be found inside, the demand would be so small that the manufacture would soon cease.

Publicity.

The art of advertising is to notify the public that one can supply an existing demand, and so to educate them that they will demand what you have to supply. The ideal we all aim at is to obtain the greatest possible consumption per service; but unless we are prepared to tell our consumers what gas can do and how they may obtain the necessary appliances, we are not likely to succeed.

The admirable advertisements issued by the British Commercial Gas Association make attractive and interesting reading in many newspapers. From a national standpoint, the industry's advertising is good, but, in my opinion, this must be backed up by local advertising if the full benefits are to be obtained. We must lose no opportunity of letting the public

know what gas can do, and we must be prepared to hit hard with facts, but all the time be strictly accurate in our statements. By such methods it will be possible to make the public realize that gas undertakings are trying to do their best for the general good, and that it is to their own interest to support the industry as far as they can.

It must, however, be remembered that no amount of advertising will be of much use unless backed by efficient service; for the satisfied consumer is certainly our strongest line of defence against any competitor—be it oil or electricity.

EDUCATION.

This is certainly rather an inopportune time to say a great deal about the Institution of Gas Engineers' Education Scheme, as at the moment things are in a rather difficult position. But whatever our opinions may be, we must realize that a great deal of work has been done by the Institution of Gas Engineers to make this Scheme a success and to aid the student.

As one of your representatives on the Western Area Education Committee, I feel that I must say that in my opinion the rules as to where a student shall obtain his tuition are far too rigid, and have made it practically impossible for a great number of possible students to qualify for examination. The whole Scheme is, however, having the attention of the Institution of Gas Engineers, and it would be serving no good purpose for me or anyone else to criticize it further at the moment.

VOTE OF THANKS.

Mr. J. T. SPENCER (Weston) proposed, and Mr. A. MARSDEN (Bristol) seconded, a hearty vote of thanks to the President, which was carried with acclamation.

The PRESIDENT suitably replied.

PRESIDENTIAL ADDRESS OF ROBERT J. GAVIN.

Scottish Junior Gas Association (Eastern District), May 4.

EDUCATION.

The amended Education Scheme was brought into operation two years ago, and, while a great step forward was made at that time, I am afraid the more widely scattered districts (of which we are a striking example) still feel that more might be done for the isolated student. The problem is a very thorny one, but a great many of the difficulties might be overcome, I think, by the exercise of perseverance, and a display by the isolated student of a real desire to meet the requirements of the Institution Scheme by procuring his education locally, and then approaching the Committee. Our Association is represented by two members on the Scottish Advisory Committee, and a certain amount of doubt regarding the good faith of the student has been aroused in the past, when the advice tendered by that Committee seems to have been disregarded. I think it would be a retrograde step to scrap the Education Scheme as it stands and substitute for it an Examination Scheme. I know there is a strong feeling in the Association for an examination to test the knowledge of the student, by test only, and to make no proviso as to where that knowledge is obtained. While there is something to be said for that point of view, we have to consider, on the other hand, the obvious unfairness of a system which would allow a man to procure a certificate of efficiency in gas engineering by cramming—his only qualification being a good memory. The Scottish Education Code is a very efficient one. There are few towns in our area which do not have continuation classes in the ancillary subjects up to Stage III. When this stage is reached, a Central Institution Bursary is available to enable the student to get to one of the centres, be it Edinburgh, Dundee, or Aberdeen. Where it is impossible to reach these centres, the Committee have power to grant the concession that the student may get his education where he will; but it cannot truthfully be said that such a case has yet come to the notice of the Committee. While we are assured by the Education Authorities that the Central Institution Bursary is available to all students who have attained the necessary proficiency in their provincial college, still it is only fair for me to stress here that a rather stringent examination of the student's financial position is made, and this is naturally a great stumbling block to the Scheme. It directly affects the Institution Scheme in Scotland, as I know of cases where the idea of attending the class has been abandoned, rather than submit to the indignity of declaring financial resources. The assistance of such students might be well taken in hand by the Senior Associations in Scotland, instead of the whole grant going to the Central Institution as at present. There is no doubt that here an undoubted anomaly exists, whereby young men who are receiving first-class practical training as gas engineers in the provinces are precluded from attaining the examination stage in gas engineering, and specialists who are fortunate in being placed near a centre of instruction may gain the Certificate in Gas Engineering purely from theoretical knowledge.

I have gone rather fully into this question, because a good deal of misunderstanding has been created through the Scheme never having been fully explained. The present unrest and dissatisfaction with the Scheme is extremely unsettling and detrimental to the progress of the student, resulting in his pursuing a policy of *laissez faire*, and neglecting systematic study in the fear that his efforts will be superfluous. Nevertheless, I say it is incumbent on everyone of us to lend ourselves to the task of satisfying the needs of the present Education Scheme to the best of our ability, and, if further concessions are made, we shall not be losers. When the goal is reached, we shall be all the better of our striving. The prize which is easiest won is the least valuable.

In casting around for a subject to deal with in this address, it has occurred to me that it might be interesting to set before you a brief description of our works; the problems met with on a 200-million works; and how they were dealt with.

CARBONIZING PLANT—VERTICAL RETORTS.

The installation is of the Woodall-Duckham type, and consists of one bench of four settings, each setting containing four retorts served by one producer on each setting. Any one setting may be heated up or let down without in any way interfering with neighbouring settings. The retorts are capable of dealing with 5½ tons per day; the output of the whole plant being rated at 1¼ million c.ft. of gas per day while steaming.

Particular care is paid to the securing of the best possible coke to suit our rapidly growing local market; the coal purchased, accordingly, is the coal which can be most satisfactorily

THE PRESIDENT,
R. J. Gavin, of Kirkcaldy.

Mr. Gavin received his early training at the Galashiels Gas-Works. After three years' active service with the R.N.V.R., he was in 1920 promoted to the position of Assistant Engineer at Galashiels. In 1926, he was appointed Chief Technical Assistant to the Kirkcaldy Corporation Gas Department. He is an Associate Member of the Institution of Gas Engineers.

treated in the plant, and will yield a coke low in ash, which will command a ready market. We also endeavour to encourage local sales of coke; and how far we have succeeded in this is evidenced by the fact that 87 p.ct. of our annual coke sales are purely local.

In accordance with modern practice, steaming is carried out on the vertical plant, and a few remarks on methods and results might be of interest. Formerly we superheated the steam to a very high degree—the temperature of the steam being 700° C. This was achieved by placing tubes of varying designs

in the waste-heat gathering chamber, and the steam was introduced into the retort by the usual channels and ports. Tests were made to ascertain the increased results from the use of superheated steam, and, curiously enough, these were found to be practically non-existent. Below is a note of comparative analyses showing the composition of the gas:

—	With Superheated Steam.	With Steam of approx. 184° C. Temperature.
	P.Ct.	P.Ct.
CO_2	2·5	2·8
O_2	0·7	0·9
C_nH_m	2·1	2·2
CO	21·6	21·0
CH_4	16·7	17·6
H_2	48·1	46·8
N_2	8·3	8·7

Having regard to the cost of upkeep of the superheating tubes (which was rather high), and to the fact that there did not seem to be a return commensurate with this outlay, we decided to revert to our present method of steaming, which is carried out at 12 lbs. per sq. in. pressure by a reducing valve through a $\frac{3}{16}$-in. nipple. It appears that the present method allows the steam to enter the retort in a lazy fashion, and is conducive to the most intimate contact with the incandescent coke. Though the water gas reaction is an endothermic one, taking place at 1000° C., we do not find that there is any appreciable difference in coke used in producers through introducing the steam at a lower temperature. Neither is there any noticeable damage to the brickwork on the bottom of retort due to steaming, and it seems that the bulk of the steam is decomposed when working with a long flame in the combustion chambers, and these conditions are certainly conducive to good tar production, as the tar made last year was 21·36 galls. per ton.

Nevertheless, we are making alterations in the method of introducing the steam into the retort, in order to make it more positive, and with a view to more intimate contact. By lowering the position of inlet to the bottom of the curved plate, so that the steam enters on the centre line of the retort, distribution throughout the charge is assured; whereas by the former method, the steam entered by the side of the retort, there being a possibility of some of the steam going straight up between the coke and the side walls of the retort. We also hope that the admission of wet steam at this point will make for cooler retort castings, and the infiltration of inerts through the bottom brickwork minimized, if not prevented. How far these objects will be achieved by this alteration, I am not in a position to say, as the complete change over has not yet been effected, but it would seem that the alteration has the effect of keeping the castings cooler, and also of materially assisting in the quenching of the coke.

Perhaps it might be interesting if I gave here a few figures regarding our production of gas, &c. Since the introduction of the vertical plant, we have experimented with the calorific value of the gas distributed, with the object of ascertaining the quality which would:

(1) Give the best results to the consumers.
(2) Cause no undue trouble in distribution.
(3) Be most cheaply produced.

The results of these tests have convinced us that a gas of between 425 and 430 B.Th.U. per c.ft. would most suitably fulfil our requirements, and we are consequently distributing a gas having an average calorific value of 425 B.Th.U. per c.ft. The following figures show production of gas per ton and per retort under the different calorific values:

Calorific Value.	Make per Retort per Day.	Make per Ton.	Carbonizing Wages	Therms per Ton.
	C.Ft.	C.Ft.		
470 B.Th.U.	81,108	16,464	2·12d.	77·3
450 ,,	83,416	17,040	1·88d	76·6
426 ,,	83,453	18,230	1·69d.	77·6

The calorific value of the gas is ascertained twice per day by means of a Simmance "Canadian" pattern calorimeter, one test being made on the gas at the outlet of station meter, and the other on gas from the town mains. Records are also kept by means of a Wright "Calorgraph," which is carefully calibrated each day with the standard; and, for the guidance of the retort-house staff, a Peebles "B.Th.U." indicator is installed, so as to give a quick indication of variations in the calorific value of the gas.

We have in Kirkcaldy rather a low holder accommodation in comparison with our maximum daily output, and this fact makes itself felt in various directions. Our storage comprises four holders—three at the works, and a district holder at Pathhead—one only of which is effective in view of modern distribution pressure requirements. The Pathhead holder (two-lift) is only partially effective in pressure throwing capabilities, as when it uncups only 25-tenths are available.

Our maximum daily output in December was 724,100 c.ft., with a total holder capacity of 584,100 c.ft. Of the reputed 584,100 c.ft. storage capacity, only 438,000 c.ft. is actually effective. It will be seen, therefore, that on the day of peak load, the holders are emptied and filled twice in the 24 hours, no margin being allowed for any contingency or breakdown in the manufacturing plant. Careful attention has to be paid to gas stocks, and the utmost elasticity of the vertical retort plant is exercised to meet sudden and unforeseen demands.

In considering a scheme for the enlargement of capacity, it had to be borne in mind that there is no room at the gas-works for an additional holder. In fact, the two obsolete holders will, in the course of a few years, be removed for extensions to existing plant.

We had two alternatives: (1) To erect a new holder on ground to be acquired near the works, or (2) to take steps to make the Pathhead holder wholly effective from a pressure raising point of view.

The time was found to be not yet ripe for carrying out the former scheme, because the Department is already saddled with large capital costs. The policy, therefore, is to retrench on capital outlay, and endeavour, by making the gas as cheap as possible, consistent with the best service, to increase our output, and at the same time reduce the debt as quickly as possible.

The Pathhead holder serves a district entirely distinct from that served by the works holder. Approximately 33 p.ct. of our total output is distributed through this holder, and as the holder must remain cupped, the 100,000 c.ft. in the inner lift is of little service. After fully considering the pros and cons, the decision was reached to place a booster at the Pathhead Station, and this work is now proceeding. The plant consists of a Bryan-Donkin booster of 40,000 c.ft. per hour capacity, at 2300 R.P.M., against a difference of 4 in. pressure, driven by a 2½-B.H.P. vertical National gas engine, with an electric motor as a stand-by.

The method of operation will be as follows: When the holder is likely to uncup, the attendant will start the pressure-raising plant, and weight the diaphragm governor to give a pressure of (say) 2-tenths in excess of the station governor outlet pressure. This will cause the station governor gradually to close off, and the supply will then be by the booster governor direct. In shutting off the booster, the reverse process will take place, the attendant weighting the station governor slightly over the requisite pressure, and then, by slowly removing the weight on the diaphragm governor, allow the station governor to come back into action and resume control. With this arrangement, we hope to be able to utilize the whole of the existing holder, and, at the same time, give a pressure to our consumers commensurate with modern requirements.

The following table shows our annual make since 1920, along with the net capital of the undertaking per million c.ft.:

Year.	Gas Made.	Net Capital per Million C.Ft. Made.
1921–22	134,842,000 c.ft.	£1248
1922–23	151,146,000 ,,	1097
1923–24	156,958,000 ,,	1035
1924–25	162,381,000 ,,	972
1925–26	172,445,000 ,,	896
1926–27	182,973,000 ,,	836
1927–28	184,165,000 ,,	809

It will be seen that the policy of the undertaking has been fully carried out, and that though the capital charges are still high, they are being reduced year by year with a fair measure of success.

Distribution.

In these days of keen electrical competition, it is essential that no gas appliance be fitted unless its efficiency is known or has been tested. The housing authority in Kirkcaldy specified a gas wash-boiler for their housing schemes, and the matter was referred to my Chief for his advice as to which boiler should be accepted. When the wash-boilers were first tested, the efficiency was found to be somewhere about 40 p.ct., and as this was surprisingly low, the matter was referred to the makers. After the burner was re-designed, the efficiency rose to 50 p.ct., which means a considerable reduction in the consumer's bill.

The wash-boilers chosen for the housing schemes were 10-gall. capacity, comprising a strong cast-iron outer casing mounted on legs, with rustless cast-iron pan, wooden lift-off cover, and fitted with ¾ in. brass draw-off tap. The cast-iron boiler was chosen in preference to tinned copper, because of its being more likely to stand up to the conditions of housing schemes. The fitting of the wash-boilers is carried out by this Department at a contract price to the housing authority. By this arrangement, we are assured that the appliance will not be condemned through faulty fitting. Provision is also made for a gas cooker in each house, and this is fitted by our own staff. Cookers are let out on a ten years' hire-purchase system, and hotplates on a seven years' system, fitted free, the conviction being that this method is preferable to free loan. It is a well-known fact that, when an appliance is given free, the consumer is not nearly so careful about its upkeep as he would be if the appliance was ultimately to become his own property. In addition, the contingency of cookers being returned in bad condition, and their

disposal or re-conditioning, does not arise to the same extent. In the few cases of removals, &c., where the cooker is handed back, we re-condition the appliance if necessary, and re-issue it at a reduced paying-period in accordance with the time it has been in use. It is noteworthy that, though hire-purchase schemes have been in operation for ten years, we have not a case where a cooker so hired has not paid for itself. By this method also, expenditure is not so great, as a tenth of it is being repaid yearly. The higher-grade cookers are sold at cost price, and fitted free. Gas fires are sold at practically cost price, the material used being charged for, but the time necessary for fixing is given free.

We also endeavour to keep in close touch with architects and builders; and when news is received of new building projects, an interview is obtained with the architect, so that the arrangement for a gas supply and the installation of appliances may go forward. We find the architects and builders appreciative of this service, and it has been instrumental in converting some who had strong electrical prejudices into enthusiastic advocates of gas.

RECONSTRUCTION WORK AT THE BLACKPOOL GAS-WORKS.

Inspection by the Manchester and District Junior Gas Association.

On May 4 about eighty members of the Manchester and District Junior Gas Association assembled at the Blackpool Gas-Works, where they were received by the Gas Engineer, Mr. J. H. Chew, Councillor L. Newsome (Vice-Chairman of the Gas Committee), and Councillors J. Whittaker and W. Newman.

The guides who conducted the party round the works were the Technical Staff of the Department—Messrs. Reynolds, Jolly, Bennett, and Hartley.

After the inspection, tea was served at the Clifton Hotel.

The MAYOR (Mr. John Potter, J.P.) welcomed the visitors to Blackpool, and made reference to former visits paid by the Association in 1911 and 1921.

Mr. J. T HAYNES (Bolton) moved, and Mr. F. A. COLLIER (Oldham) seconded, a vote of thanks to the Mayor and to the members of the Gas Committee for their hospitality.

EXTENSIONS AT THE BLACKPOOL GAS-WORKS.

By T. REYNOLDS, Assistant Engineer to the Blackpool Gas Department.

In 1924 an entire reconstruction and enlargement of plant was commenced at the Blackpool Gas-Works.

An installation of forty-eight 5-ton per day Glover-West vertical retorts was commenced in 1924 to replace an installation of inclines. These are the 40-in. steaming type. The plant is fitted with the usual Spencer-Bonecourt waste-heat boilers, and the steam generated therefrom drives two Browett-Lindley electric generators, one 100 KW. and one 75 KW. These are capable of supplying the whole works with electricity. The cost of current generated in this manner is 0·37d. per unit.

A further economy has since been effected on the boiler installation by substituting geared turbines for electrically driven fans. The exhaust steam from the turbine is employed in the retorts, allowing a larger surplus of live steam for use on the works. This substitution has enabled us to close down three Lancashire boilers previously used for exhausters, pumps, &c., and to employ these boilers solely for the production of carburetted water gas.

To ensure a more scientific control of steaming, Kent steam meters have been fitted on the exhaust steam mains; and these have proved far more satisfactory than was anticipated.

Insulators were fixed on the offtake pipes of this plant to prevent radiation of heat and improve working conditions for the top-men. These are simply sheet iron tubes 2 in. larger in diameter than the offtake pipes, held in position by bands with distance pieces between the pipes. This forms an annular space between the offtake and the sheeting, in which the air circulates by convection, thus taking away the heat and partly preventing radiation.

A Glover-West installation of the non-steaming type with 50 cwt. throughput was erected in 1911-12, the coke being handled by trucks and then tipped into telpher skips. No mechanical means were provided for filling producers or retorts with coke. This plant was entirely remodelled last year, the bench being demolished down to the brick piers. The bench bracing was left in, a new floor put in, and 60-cwt. steaming retorts were erected. A trench was excavated under the setting and a 70-ton per hour lip bucket conveyor installed to encircle the bench. Outside coke hoppers fed from the lip bucket conveyor were put down, and an automatic loading device worked from the telpher for stacking sized material completed the handling of coke. Producer and retort filling coke hoppers were erected inside the house with chutes to either stage.

Two Spencer-Bonecourt boilers were installed level with the producer stage. These, as in the 1925 installation, are driven by Turney turbines direct coupled to the fans. The exhaust steam is re-superheated, and used in the retorts.

The six chimneys on the old plant congested the charging stage and made working uncomfortable. In this instance one large chimney was erected over the common products box to the waste-heat boilers.

The producers are of the step-grate type, but the bottom step was replaced by a row of steel **V** bars resting on two bearers and sloping slightly downwards to the back of the producer. The bars are 4 ft. in length and 18 in. above the bottom of the producer. While this innovation resulted in a greater yield of producer gas for the size of the producer, it was found that the fuel consumption was heavy and the fires difficult to clinker. They are therefore being converted to the ordinary step-grate type at the present time.

CARBURETTED WATER GAS.

Two carburetted water gas plants by R. & J. Dempster, Ltd., were installed on the works in 1915-16, having nominal capacities of 500,000 c.ft. and 750,000 c.ft. per day respectively. To cope with the increasing consumption, the output of these plants had to be increased without much structural alteration, owing to lack to space. The generator of the 750,000 plant was enlarged from 9 ft. 6 in. to 10 ft. 6 in. diameter. The air duct, previously provided with four nostril holes running round the underside of the grate, was dispensed with. This gave approximately a 12 in. deeper fuel bed. The air inlet was lowered and air blown against a baffle plate, deflecting it round the bottom of the grate. Back-run valves were fitted to the offtake pipes, one vertical and one horizontal. The old down-run hot gas valve faces were removed, the body was left in position, and the top was blanked up.

The back run valves were not a success, becoming pitched up after a couple of shifts, and refusing to operate efficiently. Water sealed valves were then tried. The back-run valves were removed, and the offtake pipe was coupled direct to a seal pot provided with a 14-in. pipe inserted in an 18-in. pipe, thus forming an annular space between the pipes. The back run pipe was provided with a similar arrangement.

On a forward run, the water in the common seal was displaced, and forced up the annular space sealing off the back run pipe, or *vice versa*. Owing to the velocity and volume of the gas produced, water was discharged down the back-run pipe to the underside of the generator. A more positive method of blanking-off the forward run from the backward run was therefore necessary. I do not wish to condemn the water seal method. This is workable providing sufficient area is allowed in the pot and annular space of the seal for proper displacement.

A simple method was devised by inserting two single-faced valves horizontally and in line immediately above the existing seal pot, both working on one rack and pinion, which also works the 3-way steam valve. The outer pipe inside the pot, which formerly formed the seal, was burned off, and the annular space dispensed with, to overcome any possibility of the pitching-up of these valves. Hot water from the settling beds is supplied to the top side of the valves and an overflow provided back to the common seal pot; thus the faces are constantly kept cool, free, and perfectly gas tight. This system of valves has proved very successful and is practically foolproof.

The addition of the back run and the 12-in. enlargement of the generator has increased the output of this plant from 750,000 to 1,300,000 c.ft. per day.

On the completion of these plants, shift engineers (all technically-trained men) were put in charge of carbonizing and general supervision of work during their shifts. This class of supervision has proved very successful. The attention given to throughput and steam to each individual retort has resulted in a far greater efficiency per ton of coal. A steady 84 therms per ton has been maintained over the past three years. (Our calorific value is 450 B.Th.U.)

CONDENSERS.

Up to the commencement of last summer it was difficult to keep down the temperature of gas entering the Livesey washers. We found the exhausters increased the temperature 15° to 20° Fahr., due to compression. A 5-million Holmes super condenser was therefore put down on the outlet of the exhausters at the East Works, and a 3-million water-tube condenser at the West Works. This method of final cooling appears to be becoming common practice, and it certainly ensures better results from the washing plants. At the present time

the whole of the gas is manufactured on the East Works; the West Works being used only for part purification.

To enlarge the purifier capacity at the West Works, four water-lute purifiers were converted and enlarged to the dry type, and two additional catch boxes were put down; the work being carried out by Messrs. R. & J. Dempster, Ltd.

Storage.

Our No. 1 holder, a three-lift column-guided one, having a capacity of 500,000 c.ft. and erected in 1860, was dismantled, the existing brick tank repaired, and a four-lift spiral-guided holder erected by Messrs. Clayton, Son, & Co., Ltd., of Leeds; the capacity being increased to 750,000 c.ft. As the storage capacity of the holders towards the end of 1927 was only equivalent (in the season) to approximately 14 hours' supply, the enlargement of No. 2 holder was commenced. This was a two-lift column-guided holder erected in 1880, having a capacity of 750,000 c.ft. It has been converted to a four-lift spiral-guided one of a capacity of 1,500,000 c.ft.

Station Meters.

Our station meters were naturally too small to deal with the increased output from these extensions; and we therefore decided to instal "Connersville" meters. A 20 in. by 60 in. meter capable of measuring 8½ million c.ft. per day was fixed on the outlet of the Dri-Gas plant; and this deals with the gas from both works. A 12 in. by 30 in. 2½-million "Connersville" meter was also installed for the registration of crude carburetted water gas.

It may interest you to know that one of our largest consumers in the town has been supplied with a 5 in. by 15 in. 20,000 c.ft. per hour "Connersville" meter, owing to the limited space available. All registrations below 800 c.ft. are performed by an "Emco" meter of the ordinary high-capacity type. I am convinced these will be widely used on large consumers' premises when a little more experience has been obtained, and more reliance placed on their accurate registration. To ensure these meters working smoothly we have found it advisable to wash out the gears with paraffin every three months, and fill up with new turbine oil.

Dry Gas.

The subject of dri-gas has already been discussed at various times, particularly in a paper read before the Southern Association of Gas Engineers and Managers in November, 1927, by Mr. C. Harris, of Taunton [see "Journal" for Nov. 23, 1927, p. 529]. A Holmes calcium chloride plant for dealing with 5 million c.ft. per day was put into operation last June. It is fixed on the inlet side of the 8,400,000 c.ft. "Connersville" meter. On our lowest loads we are in a position to meter the gas before and after the plant. Over a period of two months an average loss in drying of 2 p.ct. was measured; approximately 60 p.ct. of the suspended moisture being extracted. The dew-point of the inlet gas was equivalent to 95 p.ct. saturation, and that at the outlet of the plant equivalent to 35 p.ct. saturation.

We experienced trouble with the evaporator after the plant had been working three months. Holes appeared in each cast-iron tube, and this was found to be due to wrought-iron chaplets being left in the tubes during manufacture. The whole of the evaporator was dismantled, and the holes were tapped out, and were filled with cast-iron plugs.

After treatment, the gas is passed to the holders which have been oil filmed. "Imunol" has been used, and found to give a better film than gas oil; but it is, of course, more costly. A cheap acid-free common engine oil, costing 9d. per gall., has also been tried in a separate holder, and this works quite well. Care, however, must be taken to obtain a non-emulsifying oil. Should saponification take place, the saturation of the gas will obviously be increased.

Our No. 3 holder constructed in 1900 has a timber trussed roof which was naturally saturated in water. On the installation of the plant, gas entering this holder with 35 p.ct. saturation returned showing 53 p.ct.—an increase of 18 p.ct. The roof is gradually drying up, and better results are now being obtained.

Nos. 1 and 2 holders, both with iron roofs, give an increase of only 5 p.ct. between inlet and outlet. It was found necessary to pour oil into the duck foot of the syphons of Nos. 1 and 2 holders, to seal off the suction pipe and prevent blowing. After taking into consideration the amount of moisture picked up from the outlet of the plant to the inlet of the town governor, I should say that it was far better to instal a "Dri-Gas" plant after the holders, particularly if loads are fairly even. Though the loads may vary considerably, and the plant be overtaxed at periods of the 24 hours, better results will ultimately be obtained than by storing dry gas. The cost of oil filming would be saved, and the risk of oil thinning and exposing the water is eliminated, for, should a holder blow slightly, oil is displaced to the outer edge of the tank, and has to be pumped back.

Though filming undoubtedly will prolong the life of a holder, one cannot prevent oil adhering to the outside. The paint is eventually turned black, and during high winds, oil from the cups is blown out probably over a wide area. This would be objectionable in a good many towns where appearances of holders are carefully considered, and particularly in works of the garden type where plant life would be destroyed. Waterless holders, of course, overcome these difficulties.

Good results have been obtained on the district. The syphons are now entirely dry, with one exception, and tests of this water prove it to be surface water percolating into the main through drawn joints. This fault is being remedied at the first opportunity.

The percentage of saturation of the gas is given below at each mile radius from the works. One month after the plant was put to work, and up to April last.

—	Miles. 1.	Miles. 2.	Miles. 3.	Miles. 4.
	P.Ct.	P.Ct.	P.Ct.	P.Ct.
July, 1928	77	80	92	91
April, 1929	57	56	68	57

The lower percentage of saturation on the fourth mile over the third mile can be accounted for by the fact that the fourth mile is direct high-pressure fed, and the third mile is on low pressure.

Valves on the district governors were difficult to operate owing to rust dust from the inside of the steel mains. An oil atomizing plant was therefore installed with a spray into each town supply, to coat the mains internally with a film of oil.

Syphon Pumping.

Syphon pumping in most works and districts is a necessary evil. Previous to the installation of our "Dri-Gas" plant, syphon pumping was reduced to a minimum by the purchase of a motor tank wagon. It is an ordinary Morris one-ton chassis fitted with an oval steel tank holding 250 galls. of liquor. The pump, a small two-bladed rotary of 2 in. diameter, is driven by a chain coupled direct to the engine and worked with a tapered "Ferodo" lined cone inside a hollow band forming a clutch. The pump will deal with 20 galls. per minute. The whole apparatus is small and compact, and fits snugly under the bonnet.

The car is fitted complete with flexible suction hose, delivery pipe to tank, and priming pipe from the tank; one man carrying out the work. The objectionable smell usually associated with this operation due to gas liquor in the streets and drains was overcome. The total cost at the time of purchase in 1927 was £273. The pumping plant may, of course, be fitted to any suitable chassis.

Since the installation of our "Dri-Gas" plant, this tank is now used only for works syphons.

The total cost of the extensions during the four years I have been with the Department amount to approximately £275,000.

WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.

Annual General Meeting.

The President (Mr. C. B. Felton) presided at the Annual General Meeting of the Association on Saturday, April 27, at the Gas Offices, Bute Terrace, Cardiff.

The Council and members welcomed Mr. J. H. Canning, O.B.E. (Engineer and Manager, Newport), who, at the outset, spoke to the members at some length on the art of public speaking.

The Hon. Secretary (Mr. H. S. Bartlett), on behalf of the Council, submitted the seventh annual report, which was adopted. In this it was stated that six new members have been elected during the session now ended, and the total membership now stands at 106.

The Hon. Treasurer (Mr. B. J. Bell) submitted the statement of accounts, which was also approved; and the President and Officers were thanked for their services during the past session.

Office-Bearers.

The election of Officers for the ensuing session then took place, and resulted as follows:

President.—Mr. W. E. Crowley (Newport).
Senior Vice-President.—Mr. C. H. Collins (Swansea).
Junior Vice-President.—Mr. R. J. Williams (Abertillery).
Hon. Treasurer.—Mr. B. J. Bell (Cardiff).
Hon. Secretary.—Mr. H. S. Bartlett (Cardiff).
Members of Council.—Messrs. C. S. Thane (Newport), T. Jones (Penrhiwceiber), S. E. Brett (Rhondda), R. J. Martin, T. Noall (Cardiff), and W. T. Lane (Cardiff).
Hon. Librarian.—Mr. F. H. Osborne (Cardiff).
Hon. Auditors.—Messrs. J. Hislop (Newport) and T. Smith (Cardiff).

After the meeting, the members were entertained at tea by the Chairman and Directors of the Cardiff Gas Light and Coke Company; and a vote of thanks for their kindness was proposed by Mr. W. E. Crowley and seconded by Mr. C. H. Collins.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Co-Ordination of Underground Services.

SIR,—The report of the Commission of Inquiry into the Holborn explosions has been read with great interest by many in this country. I would like to comment here on two of the paragraphs.

Paragraph 148, "Subways," refers to a question of which we have heard from time to time in our large cities. In the past, we have been able to prevent the installation of any gas mains in such subways. In fact, I do not believe there are any subways for underground structures in existence in this country. It happened that on the day the report was received in Philadelphia, a suggestion was made at a meeting of a Committee on Municipal Affairs as to the advisability of such a subway. The Holborn experience was quoted as another evidence against a subway.

Paragraph 150, "Co-Ordination," is my principal reason for writing this letter. In Philadelphia, since 1884, there has been a Municipal Board of Highway Supervisors, composed of the chiefs of the various bureaux in the city government, whose duties relate to paving or the installation of underground structures. This Board has entire authority in the location of all underground structures, whether belonging to the city or to private corporations. As a result of this single authority for underground locations, sub-surface space has probably been used to better advantage in the last forty-five years than anywhere else in this country. Like any other human agency, the Board does not function perfectly, and there have been some irritating examples of the Board's refusal to exercise over some of the city structures the authority it possesses. On the whole, however, as has been already stated, the Board has thoroughly justified its existence; and for one who is used to its workings, it is hard to realize that the London territory, with its great congestion of underground structures, should, up to the present time, have had no co-ordination in the location of the structures.

I believe anyone whose duty it is to follow up the recommendation of paragraph 150 would do well to obtain information as to the Philadelphia experience.

WALTON FORSTALL,
Engineer of Distribution.

Philadelphia Gas-Works Company,
1401, *Arch Street,*
Philadelphia, Pa.,
April 26, 1929.

Tongued and Grooved Brickwork.

SIR—After twenty-five years' experience, I feel I can speak for the practical man, and challenge the statement of the author of the paper on the "Heat Control of Continuous Vertical Retorts" (see "JOURNAL" for April 24, p. 203): "As it is always the custom for the tongue of tongued and grooved bricks and specials to be laid facing downwards, any dressing of the bricks necessary to conform to levels should be done on the grooved side, as this, being uppermost, can be seen and inspected better."

There are two debatable points:

(1) Is it a custom to build with the grooves uppermost?

(2) Is the practice of having the groove uppermost good?

As regards (1), while aware that certain builders who used to erect settings with the tongues uppermost now erect with the grooves uppermost, other builders still retain, after twenty-five years' experience, the practice of having the tongues uppermost. Experience demonstrates that the practice of "grooves uppermost" is by no means so universal as to be designated a custom.

As regards (2), I maintain that the tongue should be placed uppermost:

(*a*) The natural position of the special as it rests on the floor, platform, or barrow, is tongue uppermost.

(*b*) In dressing the specials, the brick chips fly about and lodge in the groove (if the latter is uppermost), where they are difficult to brush clear. Hence thick joints may easily result. Thus the tongue uppermost has a decided advantage.

(*c*) Specials should be cut on the grooved side, not to assist inspection, but because much time and labour are saved by so doing.

(*d*) Assuming that good work be the desideratum, how can (when the groove is uppermost) the groove side be cut, when bedding the next course, unless the grooved side of the course already laid and jointed be cut—which would, of course, disturb and spoil the yet green jointing?

For thin joints and good brickwork, the consensus of opinion must favour the tongue uppermost; and I await to hear what can be said to the contrary.

AD REM.

May 2, 1929.

PARLIAMENTARY INTELLIGENCE.

[From Our Special Correspondents.]

HOUSE OF LORDS.

Private Bills and Special Orders.

The Lords Amendments to the following Bills have been agreed to by the House of Commons, and the Bills returned to the Lords to await the Royal Assent, which will be given on Friday, May 10: Gas Light and Coke Company, Winchester Water and Gas, Wandsworth, Wimbledon, and Epsom District Gas. The Newcastle-upon-Tyne and Gateshead Gas Bill has passed its third reading, and also awaits Royal Assent.

The Barnard Castle and Southport Gas Orders have been approved, with the following modification in the case of Barnard Castle:

P. 4, leave out Clause 12, and insert the following new clause:

12. The principal moneys secured by all mortgages granted by the Company in pursuance of the powers of the Act of 1904, before the date of this Order and subsisting at that date shall during the continuance of such mortgages have priority over the principal moneys secured by any mortgages granted by virtue of this Order.

The following Gas Orders were referred to the Special Orders Committee, which met to consider them yesterday: Stockport, Tunbridge Wells, and Ulverston. The Stockport Order is being opposed by the following Urban District Councils: Bredbury and Romiley, Cheadle and Gatley, Hazel Grove and Bramhall, and Handforth.

ROMFORD GAS COMPANY'S BILL.

The Bill promoted by the Romford Gas and Coke Company, for the purpose of dissolving the present limited Company and incorporating it as the Romford Gas Company (see "JOURNAL" for Jan. 16, p. 159), was on Tuesday, April 30, ordered by the Unopposed Bills Committee of the House of Lords (presided over by the EARL OF DONOUGHMORE, the Chairman of the Committee) to be reported for third reading.

The clause giving power to compel repairs of piping or apparatus, &c., which are in a dangerous condition (the terms of which were set out in the "JOURNAL") has been deleted from the Bill.

With regard to the power to the Company to charge a differential of not more than 0·6d. per therm in the outer part of the area as compared with the inner part, a proviso has been added to the effect that if, on Jan. 1, 1937, the Company are charging a differential price under the powers of this section, the Company, or the Essex County Council, may apply to the Board of Trade for the variation or cessation of the differential charge.

CHESTER CORPORATION BILL.

Protection for Chester United Gas Company.

A Bill promoted by the Chester Corporation for the purpose of authorizing the carrying out of various street works, &c., and to confer further powers upon the Corporation, was considered by the Unopposed Committee of the House of Lords on Thursday, May 2, the EARL OF DONOUGHMORE Chairman of Committees, presiding.

A petition was deposited originally by the Chester United Gas Company with a view to securing provisions for their protection in respect of damage to mains, &c., and protective provisions have been inserted in the Bill by agreement.

KINGSTON-UPON-HULL EXTENSION BILL.

A Bill has been promoted by the Kingston-upon-Hull Corporation for the purpose of authorizing an extension of the area of the Borough to include parts of the areas now supplied with gas by the Hessle Gas Company and the East Hull Gas Company. These two Companies petitioned against the Bill with a view to ensuring that their rights and privileges should not be prejudiced by its provisions, and clauses have been inserted in the Bill, by agreement, to that end.

The Bill was eventually unopposed in both Houses of Parliament.

HOUSE OF COMMONS.

Private Bills and Special Orders.

The Unopposed Bills Committee of the House of Commons have passed the following Gas Bills: Wandsworth, Wimbledon, and Epsom, Yorktown (Camberley) and District, and Newcastle-upon-Tyne and Gateshead.

The Southport Gas Order has been approved by the House of Commons. The Barnard Castle Order was approved with the modification cited above. When this was moved, Mr. Kelly asked for an explanation why these people were still to have priority. He understood that by the last Order those who held mortgages under the powers of the Act of 1904 were given priority over any moneys which had been raised since, and this was being continued. Mr. Herbert Williams, in reply, said he did not think any preference was involved. The amendment was proposed because the Board of Trade had been advised that the provisions of Clause 12 of the Order as they stood, considered in conjunction with Clause 12 and the repeal of Clause 51, were not quite clear. In other words, the object of the amendment was to clarify what everyone believed to be the situation, and to make sure that the situation as people understood it should in fact be the situation. The motion was then agreed to.

Suicide by Gas Poisoning.

Mr. Day asked the Home Secretary the number of persons who had committed suicide by gas poisoning for the twelve months ended to the last convenient date.

Mr. Chamberlain, who replied, said that the provisional number of deaths registered during the calendar year 1928 in England and Wales, which had been classified as suicide from gaseous poisoning, was 1088—667 males and 421 females.

IMPERIAL CONTINENTAL GAS ASSOCIATION BILL.

Proceedings in Committee.

The Bill promoted by the Imperial Continental Gas Association, to consolidate and modernize its statutory powers, and to make further provision with regard to capital, &c. (see "Journal" for Feb. 27, p. 617), was considered by the Unopposed Bills Committee of the House of Commons (presided over by Mr. J. Fitz.Alan Hope, Chairman of Ways and Means) on Thursday, May 2.

Mr. T. Seagar Berry (Messrs. Sherwood & Co., Parliamentary Agents for the Bill)) said that the Company was formed more than a hundred years ago by a deed of settlement, and obtained its first Act of Parliament in 1833. From 1833 until 1870 the deed of settlement had continued in existence, and the Company had worked under its statutory powers and the deed of settlement. The deed was in the nature of what might be called to-day the memorandum and articles of association of a limited company.

The Chairman asked if there was a fully developed company law at the time the Company was formed.

Mr. Berry said he should think not. The main purpose of the Company, he continued, was to supply gas or any other light or means of producing light, heat, or power to any city, place, or person in any foreign country, or in any part of His Majesty's overseas Dominions. As a matter of fact, the Association supplied gas in towns in Czecho-Slovakia, Belgium, and Holland, supplied gas and electricity in Brussels, and held very large interests in the Company of Gas of France.

Between 1833 and 1870 the Company had obtained several Acts of Parliament. In the latter year the old Acts were repealed, the deed of settlement was done away with, and the Company was thereafter governed entirely by statute. Further Acts were obtained from time to time subsequently, and the object of the present Bill was to consolidate those enactments, and to bring the whole of the powers into one Act, to make certain supplementary provisions, and to frame the powers more on modern lines, similar to those applying to other companies trading outside this country. Two recent Acts which illustrated that best were the Australian Agricultural Company's Act of 1912, and the Colonial Bank Act of 1925. The Bill was deposited as a late Bill. Explaining the reasons for this, he said that a few months ago there had been a phenomenal rise in the value of the Company's shares. In December, 1928, when Bills for the present session should have been deposited, the shares were quoted at 167; in February, 1929, the value had risen to over 400, and, on May 1, they were quoted at 445. It was thought that that was due, possibly, to foreign buying, with some idea of getting the control of the Company into hands other than British. These circumstances had led the Directors to promote the Bill to seek further powers, and they had thought, incidentally, that as they were promoting a Bill, and it would be an unopposed measure, they might take advantage of the occasion to consolidate the existing powers.

The Chairman asked which was the clause to which importance was attached for dealing with this particular situation.

Mr. Berry said it was the clause giving power to issue further capital. It was hoped to issue it to British holders who would not sell to foreign buyers.

The Chairman asked if there were any novel provisions in the clause.

Mr. Berry replied that the only difference was that, whereas by other Acts the amount of capital that could be issued was limited, this clause did not impose a limit.

The Chairman asked if it could be issued in a discriminating manner. He recalled a recent controversy with regard to an attempt to discriminate as to who should hold shares to be issued by a certain company.

Mr. Berry said there was nothing in the Bill which would allow the shares to be issued subject to conditions of that kind. The practicability of inserting any provision of that kind in the Bill had been considered, and the promoters had been advised that that was hardly a matter which they could ask a Parliamentary Committee to approve.

The Chairman pointed out that the Company were not bound by the ordinary Companies' Acts, but by their former statutes, as consolidated in this Bill.

Mr. Berry replied that the issue of new capital would have to be authorized by an ordinary general meeting of the members of the Association. He had no doubt that the Board would do their best to ensure that that capital was in the hands of those whom they thought would hold it and not sell. Parliament was not being asked to say that the Association should be allowed to issue capital in a particular way which might enable them to prevent its getting into the hands of certain buyers.

Sir Dennis Herbert (a member of the Committee) said that if there were already a majority of foreign shareholders, they would not consent to the issue of new capital except on condition that it be issued *pro rata*, or something of that sort.

The Chairman asked from what the shareholders derived their rights.

Mr. Berry replied that they derived their rights from the regulations of the Association, which could be altered from time to time, but only by the shareholders themselves.

The Chairman commented that the powers were extraordinarily wide, and said that the Association could issue new capital to the existing shareholders free and credit them as paid up.

Mr. Berry agreed; and added that he supposed any other joint stock company could do that, by resolution.

The Chairman asked if there were precedents for the granting of the powers now sought to statutory companies.

Mr. Berry said he believed there was a precedent for everything asked for in the Bill, except in regard to the amount of capital that could be raised; in other cases there had been a limitation of the amount, though it was often a very big limit. Asked whether the Board of Trade had been communicated with, he said he had been informed by the Board that it had nothing to report in connection with this Bill. No other Government Department was concerned. Questioned as to the phenomenal rise in the value of the Association's shares, he said it could not be accounted for.

The Chairman asked whether the Association had sold a very large proportion of its Continental holding to a foreign company.

Mr. Berry replied that that was not so.

Sir Dennis Herbert asked whether, if the Association decided to double its capital, it could issue shares to anybody.

Mr. Berry said it could.

Sir Dennis Herbert asked whether the Association was bound to issue shares for cash or other consideration, or whether it was possible to give them away as a bonus, or sell at a discount.

Mr. Berry said he was certainly of opinion that it could offer the shares at a discount.

The Chairman: At any discount?

Mr. Berry: I think so.

Sir Dennis Herbert said he did not think the Association was under the ordinary obligation such as applied to a company governed by the Companies' Acts, to issue the shares for a consideration.

Mr. Berry replied that that might be so. Under the terms of the Bill, once a general meeting had created fresh capital by resolution, it was in the hands of the Board to issue the shares as they thought fit.

The Chairman: And credit them as fully paid up when in fact they are not?

Mr. Berry: I think they could.

In the course of further discussion, Mr. Berry drew attention to the powers conferred in the Colonial Bank Act, which were very wide. Questions were asked by Sir Dennis Herbert as to whether it would be possible to issue shares to existing shareholders for no consideration whatever, or for a merely nominal consideration. The Directors might propose to give to all *English* shareholders extra shares in place of a dividend, for instance; and he asked if there was anything in the Bill to prevent that.

Mr. Berry said he would not have thought they could discriminate in that way.

The Chairman pointed out that they were bound by nothing but the provisions of the Bill.

Mr. Berry said he would have thought the Directors were subject to the ordinary obligation, as trustees for the shareholders, to do their best always for the Association.

Sir Dennis Herbert said that he personally did not mind the Association being able to issue capital to an unlimited amount; it was a question of what they could do with the shares. What he wanted to be sure about was that the Association could not give away a big share of the Association's undertaking.

Mr. Berry intimated that the Association would be ready to include words in the Bill to make that clear, because, obviously, they did not want to do anything of that sort.

The Committee then deliberated in private, and consulted with Col. LeRoy Lewis (Chairman of the Association). The Chairman subsequently announced that probably the difficulty could be solved by the insertion of a provision embodying the principle that the Association should have no power to issue any shares or stock for any less consideration, whether in cash or otherwise, than if it were a company registered under the Companies' Acts. He asked that such a provision be submitted on Monday.

Sir Dennis Herbert added that by that time it might be found that there were clauses in the Bill already which had been overlooked for the moment, but which might render the insertion of such a provision unnecessary.

The proceedings were accordingly adjourned until Monday, May 6.

WANDSWORTH, WIMBLEDON, AND EPSOM DISTRICT GAS BILL.

The Unopposed Bills Committee of the House of Commons (presided over by Mr. J. FITZALAN HOPE, Chairman of Ways and Means), on Tuesday, April 30, dealt with the Wandsworth, Wimbledon, and Epsom Company's Bill, by which it is proposed to consolidate the existing capital of the Company, to substitute the basic price and basic dividend system for the existing sliding-scale, to schedule further lands for gas-works purposes, &c. [The provisions of the Bill were detailed in the "JOURNAL" for Jan. 23, p. 210.]

Mr. ARTHUR J. LEES (Messrs. Lees & Co., Parliamentary Agents for the Company) explained the reasons for the proposed conversion of the Company's capital. Since the Wandsworth and Putney, the Mitcham and Wimbledon, and the Epsom and Ewell Companies were amalgamated to form the present Company in 1912, the stocks of the amalgamated Companies had been left as they were before the amalgamation, and new stock had been issued since, and, as a result, there were in existence no less than six different ordinary stocks. There were also two different standard prices. For the Wandsworth and Epsom stocks there was a standard price of 14d. per therm; whereas for the Wimbledon stock there was a standard price of 1s. With regard to dividends, the Wandsworth "A" stock, the Wimbledon stock, and the Epsom stock had a standard dividend of 5 p.ct., the other stocks having a dividend of 3½ p.ct. The slide was 2s. 6d. on the Wandsworth "A" and "B" stocks, though the dividends on those stocks were 5 and 3½ p.ct. respectively; it was also 2s. 6d. on the Wimbledon and the Epsom stocks, and 1s. 9d. on the Wandsworth "C" and new ordinary stocks. At present the average dividend paid on the whole of the stocks was within a few pence of 7 p.ct.; and it was proposed to give each of the existing shareholders, in exchange for the shares they held, such an amount of the new consolidated stock as would produce the same amount of dividend as they were now receiving. The holders of Wandsworth "A" stock, on which a dividend of 9 p.ct. was paid, would get £129 of the new stock for each £100 of "A" stock, the holders of other stock would receive £90 for each £100, and so on. The amounts had been worked out by the Company and checked by Sir William Plender. While the shareholders would be in the same position as before, the Company would save an immense amount in respect of bookkeeping.

The CHAIRMAN: And it will be much easier to raise new capital.

Mr. LEES agreed that it would be much easier. He added that when Wandsworth stock was referred to on the Stock Exchange under present conditions, one did not know which stock was concerned until explanations were given.

The CHAIRMAN asked if objections had been made to the proposed conversion.

Mr. LEES replied in the negative. The next proposal, he said, was to consolidate the existing 3, 4, and 5 p.ct. debenture stocks into one class of 5 p.ct. debenture stock, also on the basis of securing to existing holders the same return as at present.

The next important part of the Bill was the proposal to substitute for the present standard price and sliding-scale of dividend a basic price and basic dividend system, such as applied to the South Metropolitan, the South Suburban, and the Commercial Gas Companies. A basic price of 11·2d. per therm was proposed in the first place, but the Company had had meetings with the London County Council, as the result of which it had been agreed that the basic price should be 11d. per therm. That proposal was accepted by all the local authorities in the area of supply. That was the same as the basic price of the South Metropolitan, South Suburban, and the Commercial Companies. There was a difference, however, between the Wandsworth Company and the other three Companies with regard to the division of surplus profits. The three other Companies gave three-quarters of the surplus profits to the consumers, and divided the remaining one-quarter equally between the shareholders and employee co-partners. The Wandsworth Company, however, were going one better, for they were proposing to give four-fifths of the surplus profits to the consumers, and to divide the remaining one-fifth between the shareholders and co-partners.

The CHAIRMAN asked if the co-partners had had anything to say about that.

Mr. LEES replied that everybody was satisfied. The reason for the difference was that the Wandsworth Company had a somewhat lower capital expenditure per million than the other Companies.

Power was also sought by the Bill to manufacture gas on certain lands adjoining the existing works of the Company at Wandsworth and Mitcham. In the Bill as it was passed by the House of Lords express power was taken in the ordinary way to manufacture gas and residual products on those lands, but there had since been substituted a new clause providing that on the lands referred to the Company could exercise all such powers as were exercisable on existing lands under the provisions of previous Acts, and as extended by any public general Act passed in the present session of Parliament. The reason for that was that the Gas Undertakings Bill had passed its final stages in the House of Commons on April 29, and this conferred further powers upon gas undertakers in regard to the purchase of residuals. If the Wandsworth Company's Bill were to receive Royal Assent before the Gas Undertakings Bill, the Company would get all the powers conferred by the latter; but the Wandsworth Bill would not receive Royal Assent first, and, in that case, he did not think the Company would get the powers of the general Bill. Therefore, the clause referred to was inserted to ensure the application of the powers of the general Bill to the Company.

Mr. FRANK JONES (Chairman of the Company) proved the preamble of the Bill, and the Committee ordered it to be reported for third reading.

MISCELLANEOUS NEWS.

MERCHANDISE MARKS ACT.

Application for Marking Imported Lighting Glassware.

An inquiry is being held at the Offices of the Board of Trade, in London, into an application by the glass manufacturers of Great Britain for an Order under the Merchandise Marks Act requiring that, among other items of glassware, imported lighting glassware shall be marked with an indication of the country of origin. The Committee consists of Sir Hubert Llewellyn Smith, K.C.B. (Chairman), Mr. F. N. Barnes, and Mr. F. R. Davenport. The original application also included scientific glassware of all descriptions, including tubing and rod, but this is now to be treated as a separate application, and will be heard later at a date yet to be fixed.

The applicants as regards lighting glassware are the British Flint Glass Manufacturers' Association, which consists of some nine firms, who are also supported by three important firms outside the Association, while the Trade Unions concerned are also supporting. Messrs. Hailwood and Ackroyd, Ltd., have entered a separate appearance, and are represented by Mr. Hailwood. The applicants generally are represented by Mr. E. H. C. Wethered (Barrister), while the opponents—who consist of the China and Glassware Section of the London Chamber of Commerce, and groups of British manufacturers—are represented by Mr. A. Comyns Carr, K.C., Mr. N. L. Macaskie, and Mr. Horace Samuel.

The inquiry opened on Monday, April 29. The general case for the application is that all imported lighting glassware should bear, on importation, a mark indicating the country of origin; and it is suggested that this can be done very cheaply either by acid stamping, acid transfer, sand blasting, or enamel. The Committee were given a practical demonstration of the first two methods of marking; and the applicants claim that the cost of such stamping would be infinitesimal. Indeed, some of the witnesses on the general case have said that the cost of marking in this way is so small that they do not trouble to include it in their costings as a separate item. On the other hand, the opposition claim that the cost would be 3s. per gross, and that the marking would disfigure the goods.

According to Board of Trade figures, the imports of illuminating glassware were valued at £391,665 in 1921, £397,695 in 1922, £451,334 in 1923, £370,371 in 1924, £430,405 in 1925, and £475,916 in 1926.

Mr. WETHERED, in his opening statement, speaking of an allegation by the opponents that there is practically no illuminating glass made in this country, remarked that this was an absolute misconception, as there were actually eleven firms engaged in that branch of the trade, and the output of six of them last year reached £65,000. (This figure was later increased to £85,000.) Taking the Board of Trade figures, it appeared that British firms made 25 p.ct. of the lighting glass required in this country.

The CHAIRMAN asked what was intended to be included in illuminating glassware.

Mr. WETHERED said it included shades for gas and electric light, glass globes, bowls, lamp chimneys, and any form of glassware used for lighting purposes. During the course of further remarks, Mr. Wethered emphasized the point that all glassware imported into America must be stamped with the country of origin, and there would be no difficulty in similarly stamping all glassware imported into this country; the view of the British manufacturers being that the ultimate purchaser should have an opportunity of knowing whether he was buying British or foreign. It was further stated and emphasized that there was a rapidly growing desire on the part of the public to buy British goods, but that at present stocks of foreign and British glassware were mixed, causing confusion, and, further, that many foreign imitations were being made of British designs.

Some evidence was given on Tuesday, April 30, with regard to illuminating glassware.

Mr. *W. G. Riley*, a Director of Messrs. John Walsh Walsh, Ltd., Glass Manufacturers, of Birmingham, said that his firm had a turnover of £10,000 per annum in illuminating glassware for gas and electricity.

Mr. MACASKIE, in cross-examination, put it to witness that, if lighting shades were marked on the upper neck, as had been suggested by

one of the samples exhibited, it would mean that the mark would be covered up when the shade was attached to the fitting, and therefore the ultimate purchaser—the householder, for example—would never see the mark. Yet the Act said the mark should be conspicuous.

Witness replied that the shades were sold by the manufacturers to the wholesalers without any fittings, and therefore they would see the mark and know that the shades were British. He was not aware what such undertakings as the South Metropolitan Gas Company might do after they bought the shades.

COUNSEL also suggested that a mark on any other part would disfigure the articles, and also give the impression, when a foreign marked globe or shade was attached to British made fittings, that the whole thing was foreign.

Witness would not agree, however.

Mr. *John Northwood*, a Director of Messrs. Stevens & Williams, Ltd., Brierley Hill Glass Works, said that his firm had an output of £20,000 per annum in illuminating glassware, consisting of all kinds of lighting glass except heat-resisting glass used for high-pressure gas. He handed in samples of illuminating glassware marked on the upper neck, and, together with the previous witness, contended that, as the shades were sold separately from the fittings, the mark would plainly be seen. In his opinion it would not then matter whether the mark was covered subsequently by the fittings when in position. He did not care whether the customer covered up the mark after he had purchased the article, so long as the mark was plainly visible to the customer at the time of purchase.

Mr. COMYNS CARR, K.C., suggested to witness that it was a common practice to-day for lighting contractors to send their individual customers to select lighting fittings from large showrooms of the manufacturers, and that, as these fittings were invariably in position complete, the ultimate customer would not be able to see a mark placed in the manner suggested.

Witness said that the ultimate purchaser would certainly want to look at the glassware in his house before it was attached to the fittings, and he would at once see the mark.

COUNSEL put it that, in the circumstances, he had suggested that a stick-on label would be better, because, as witness had no objection to the mark being covered up subsequently to purchase, it would not matter if the stick-on label came off in time.

Witness said he objected to a label which could be washed off.

COUNSEL suggested that, as the Act specifically stated that the mark should be on the goods at the time of sale, it was clear it did not matter what happened to the mark after the purchaser had bought the goods, and knew what he had bought.

The CHAIRMAN also pointed out that the Merchandise Marks Act was concerned only with the goods as sold, and that so far as the Act was concerned it did not matter what the purchaser did to the goods after he had bought them.

Witness insisted that any marking should be permanent.

INSTITUTION OF GAS ENGINEERS' EXAMINATIONS.

The following questions were set in the examinations in Gas Supply and Gas Engineering which were held on April 27 and May 4 under the Education Scheme of the Institution of Gas Engineers. The Examiners were, for Gas Engineering, Messrs. R. Robertson (Bristol), W. J. Smith, B.Sc. (Bolton), H. C. Smith, M.Inst.C.E. (Tottenham), and J. Stanley Thorman (London); and for Gas Supply, Messrs. S. B. Chandler, A.M.I.Mech.E. (Tottenham), A. B. Roxburgh (Newcastle-upon-Tyne), Stephen Lacey, B.Sc., Assoc M.Inst.C.E., and H. R. Hems (Birmingham).

GAS SUPPLY.

ORDINARY GRADE.

From 2 to 5 p.m.

Sketches may be adopted to obviate long and involved statements.

The general neatness of the papers, including that of the sketches, and also lucidity of expression, will be taken into consideration in assessing marks.

(Eight Questions set; six only to be attempted.)

1. In what circumstances would you recommend steel in preference to cast iron for gas mains? Sketch two forms of joint for steel pipes, and describe methods of preventing external corrosion.

2. What do you think should be the minimum gas pressure at the outlet of consumers' meters? How are fires and cookers affected by variations in gas pressure, and to what may such variations be due?

3. Give a short specification of the sizes of service pipes, meter, and carcass pipes for an eight-roomed house. Gas to be supplied to a cooker, wash boiler, two fires, and a "3-gall.-a-minute" geyser, in addition to lighting burners.

4. A geyser has been fitted in a bathroom. State fully what you would do before passing the installation as ready for use.

Your answer should include a statement of the various points to which you would direct your attention.

5. On what gas appliances are thermostats used and for what purpose? Make a sketch of one, and explain how it works.

6. A cycle manufacturer proposes to instal drying stoves for japanning purposes. Why should you advise him to use gas, and what description of stove would you recommend?

Sketch and describe the burners you would use and the method of fixing them in the stove.

7. Explain by examples the meaning of I.H.P. and B.H.P., and state the ratio $\frac{\text{B.H.P.}}{\text{I.H.P.}}$ of a good gas engine.

8. Show how the following statements are applicable to "Gas Supply" problems.

(*a*) Normal illumination = $\frac{\text{Candle power}}{\text{Distance squared}}$

(*b*) Gases diffuse at rates inversely proportional to the square roots of their densities.

HIGHER GRADE.

Part I., from 2 to 5 p.m.

(Six Questions set; five only to be attempted.)

1. Gas is to be delivered from A to B along two mains traversing different routes. One main is 2 miles long and 18 in. diameter. The other is 2½ miles long and 24 in. diameter. The two mains together deliver 500,000 c.ft. per hour.

Calculate the quantity of gas traversing each main; also the pressure necessary at A to give 8 in. at B.

2. If you were asked to examine and report upon a new type of consumer's meter, state fully what points in its construction and operation you would consider, and how you would proceed with the examination.

Make a statement of what you consider to be desirable features for a consumer's meter.

3. In what circumstances would you recommend:

(*a*) coke boiler;
(*b*) gas circulator;
(*c*) geyser;

or a combination of any two of these for domestic hot water supply?

State in summary form the instructions you would issue to the fitters for the inspection and maintenance of each of these appliances.

4. A motor car erecting shop 150 ft. by 100 ft. requires floor illumination of 6 foot-candles (mean).

Give the following data for the installation you would recommend:

(*a*) appropriate polar curves of lamps;
(*b*) approximate form of shade, if any;
(*c*) height, spacing, and total number of lamps;
(*d*) total hourly consumption of gas for full lighting. Calorific value of gas 500 B.Th.U. per c.ft.

5. Describe with the aid of simple sketches the physics of any gas operated refrigerator with which you are acquainted.

In what ways may it go wrong, and what precautions would you recommend to minimize these troubles?

6. Calculate the composition of the products of combustion in a chimney under which is burning a good gas fire consuming 45 c.ft. per hour (500 B.Th.U. gas).

The room is 2000 c.ft. in capacity, and the air contained in it is changed three times per hour. The whole of this air change may be regarded as taking place *via* the chimney.

The composition of the gas may be assumed and stated in your answer.

HIGHER GRADE.

Part II., from 6 to 9 p.m.

(Six Questions set; five only to be attempted.)

1. What is the purpose of a service governor?

Sketch one, and explain how it operates. State as fully as possible the circumstances that justify the use of such an appliance.

2. A good method of testing gas appliances should encourage design in the direction of safety, economy, durability, and usefulness.

With these points in view describe the tests, scientific and practical, you would apply to a modern gas cooker.

3. State the physical laws relating to the loss of heat from boilers and tanks containing hot water.

Describe with sketch a water heater that embodies lagging as a definite feature, and state its advantages and limitations.

4. What is meant by annealing?

Describe with dimensioned sketch a gas fired furnace you would recommend for annealing small articles, stating the hourly gas consumption and attainable temperature of a standard size. Calorific value of gas 500 B.Th.U. per c.ft.

What instructions would you issue with the furnace to ensure economy of gas and time in its working, and accurate control.

5. Show how the following statements are applied to "Gas Supply" problems:

(*a*) $\frac{V_1}{V_2} = \frac{273 + t_1}{273 + t_2}$

Where V = Volume of a gas.
t = Temperature in degrees C.

(*b*) Law of partial pressures.

(*c*) $CaH_2(CO_3)_2 = CaCO_3 + H_2O + CO_2$.

(*d*) Horizontal Illumination = Normal Illumination × Cos ϕ

6. It is frequently stated as a practical ideal that the burning of bituminous coal in domestic grates and ranges should be abolished. What would you recommend the gas industry should do towards bringing this ideal about? Give reasons.

GAS ENGINEERING.

ORDINARY GRADE.

From 2 to 5 p.m.

Sketches may be adopted to obviate long and involved statements. The general neatness of the papers, including that of the sketches, and also lucidity of expression, will be taken into consideration in assessing marks.

(*Eight Questions set; six only to be attempted.*)

1. (*a*) Describe the construction of the regenerator furnace and the method of operating it.

(*b*) Give the composition of the gas produced.

2. Describe either of the following:

(*a*) The plant which you would employ for handling coal (delivered on sidings alongside horizontal retort house) between truck and receiving hopper on stoking machine, or

(*b*) The plant which you would employ for transporting coke from retorts to yard, and preparing it for sale.

3. (*a*) Show diagrammatically the various units of plant employed in the manufacture of carburetted water gas, in their proper relation to each other, and describe briefly the function of each.

(*b*) What quantities of coke and oil would be required to produce 1000 c.ft. of 450 B.Th.U. gas?

4. Describe how you would arrange and work a set of four purifier vessels, and explain how the oxide is revivified.

5. (*a*) Describe how the moving parts of a telescopic gasholder are sealed and guided.

(*b*) What weight would the moving parts of a gasholder 150 ft. in diameter require to be to give 10 in. water pressure?

6. (*a*) What pressure is it desirable to maintain in a retort? Give reasons for your answer.

(*b*) Describe one method of automatically controlling the pressure.

7. (*a*) Describe a station meter.

(*b*) Give the formula for correcting the volume of gas registered to normal temperature and pressure, and explain the factors used.

8. Describe how you would determine the value of a sample of ammoniacal liquor, and explain the principles involved.

HIGHER GRADE.

Part I., from 2 to 5 p.m.

The majority of the questions in this paper call for sketches. Simple line drawings only are required, provided they are clear and indicate the principles involved. Sketches should be roughly to scale.

(*Five Questions set; four only to be attempted.*)

1. You are required to design a set of four luteless oxide purifiers to deal with 1 million c.ft. of gas per diem.

(*a*) Give a sketch of the arrangement you would adopt, showing details of the connections and also of a section through one of the boxes. The main dimensions must be given.

(*b*) Explain how you would decide on the size of the purifier to be adopted.

2. A horizontal retort house is required to produce 10,800 therms per diem when carbonizing good South Yorkshire coal.

(*a*) Sketch a cross section of a retort house capable of performing this duty, showing the main features and giving the principal dimensions. Also sketch an elevation of the retort bench or benches, giving dimensions.

(*b*) Show how you would arrive at the number and size of retorts required, giving any calculations you would make.

3. A coke screening plant is required to screen coke into the following five grades: (1) Up to $\frac{3}{8}$ in.; (2) $\frac{3}{8}$ in. to $\frac{3}{4}$ in.; (3) $\frac{3}{4}$ in. to $1\frac{1}{4}$ in.; (4) $1\frac{1}{4}$ in. to 2 in.; (5) over 2 in.

(*a*) Sketch a plant suitable for this purpose, and describe its action. State the advantages and disadvantages of the plant selected.

(*b*) What percentages of the above grades would you expect to obtain after screening? State the kind of coal on which you base these percentages, and the type of retort in which it has been carbonized.

4. Sketch any well-known form of non-recording calorimeter, and explain in detail the method of making a test for calorific value.

5. (*a*) Sketch any type of station meter with which you are familiar, and describe its action. What precautions are necessary to ensure the accurate working of the meter?

(*b*) How would you correct the volume of gas recorded for temperature and pressure?

HIGHER GRADE.

Part II., from 6 to 9 p.m.

(*Five Questions set; four only to be attempted.*)

1. A gasholder is required to store 1 million c.ft. of gas. The holder is to be water-sealed in a brick tank.

(*a*) Sketch the construction of a suitable holder and tank, giving the principal dimensions. The inlet and outlet connections must be shown, also the method adopted for supporting the crown when the holder is empty.

(*b*) State what materials you would specify for the construction of the holder, and give their tensile strength.

2. Describe the method of manufacturing sulphate of ammonia.

3. (*a*) Describe a method of sampling a 10-ton truck of coal so as to obtain a representative sample for laboratory use.

(*b*) Explain how you would test the sample in the laboratory for moisture, ash, and volatile matter, and set out the results you would expect to obtain. State the type of coal to which your results refer.

4. Sketch a coal handling plant suitable for transporting coal from railway trucks to overhead hoppers in the retort house. The trucks contain large screened coal which has to be broken to a size not larger than 2-in. cube.

5. (*a*) Sketch a section through the generator, carburettor, and superheater of a carburetted water gas plant, indicating the various materials of which the plant is constructed.

(*b*) Describe the process for the manufacture of carburetted water gas.

DIPLOMA GRADE.

Part I., from 2 to 5 p.m.

(*Five Questions set; four only to be attempted.*)

1. (*a*) Assuming you were responsible for a works of continuous verticals, where coals of a heavy swelling factor had to be carbonized, describe, with sketch, the method you would recommend to obtain the most efficient results with such coals.

(*b*) Describe a dry coal cleaning plant, and discuss the effect on the quantity and sale of residuals by carbonizing coals, the ash content of which had been reduced from 10 p.ct. to 5 p.ct. by cleaning.

2. Indicate by means of a diagram the temperature of coal gas immediately leaving the retorts, and at several points in the ascension pipe to the inlet of the hydraulic main in a modern horizontal setting.

State the chief causes of thick tar and pitch being deposited in the hydraulic main, and the method you would adopt to prevent its deposit.

3. How would you proceed to draw up a "water balance" for a vertical retort installation in order to ascertain the percentage of steam effectively decomposed?

Show how the knowledge of the average composition of the waste gases from retort settings may be utilized as a measure of thermal leakage from coal carbonized.

4. Describe and discuss a method whereby ammonia may be recovered as liquor without the introduction of extraneous water.

5. Describe with sketch a modern outside producer with its necessary ancillary plant, stating the size and quality of fuel that can be used in such a producer, the throughput of fuel, the volume of gas produced, together with its quality and analysis per 24 hours—from the producer described.

Assuming a modern setting of retorts was to be heated by an outside producer designed for the purpose, state the fuel consumption per ton of coal carbonized that you would expect to obtain, and discuss the advantages and disadvantages of outside and internal producers.

DIPLOMA GRADE.

Part II., from 6 to 9 p.m.

(*Five Questions set; four only to be attempted.*)

1. Discuss the various methods in vogue for coke cooling and quenching, with particular regard to their relative merits from the point of view of

(*a*) coke quality,
(*b*) general economy.

2. Describe and sketch a carburetted water gas plant embodying all modern improvements.

Describe the factors which influence the cracking process and the operating points to be observed with a view to obtaining a high gaseous thermal yield from the oil in conjunction with the production of a good oil tar with a minimum emulsive tendency.

3. The maximum requirements (electrical) amount to 1000 KW. per hour, and the load varies up to 60 p.ct. during day and night. Describe the type and capacity of generating sets you would instal to meet such requirements, and give the reasons for your selection.

4. (*a*) Describe the type of boilers and grates you would select to be fired with coke breeze below $\frac{3}{4}$ in. Give a diagram of a Lancashire boiler setting, indicating where air leakage and loss of heat most frequently occur.

(*b*) Softening is generally advisable for boiler feed water. State the chief points you would consider in selecting a lime soda softening plant.

5. Describe and give a general sketch of a waterless gasholder, and sketch (larger scale) a cross section through the seal, showing in detail the method of sealing.

Give the specification of the sealing medium, and state your reasons for such specification.

HEMEL HEMPSTEAD DISTRICT GAS COMPANY.

Annual General Meeting.

The Annual General Meeting of the Hemel Hempstead District Gas Company was held on Monday, April 22—Mr. Samuel Cutler, A.M.Inst.C.E., M.Inst.M.E., the Chairman, presiding, supported by Messrs. W. H. Day, F. R Smith, and G. H. Rogers (Directors); G. M. Gill (Engineer); E. J. Skerman (Secretary); and H. C. Dunbar (Manager).

The annual report of the Directors was as follows:

There has again been a considerable addition to the number of consumers, and the quantity of gas sold shows an increase of 4·2 p.ct. over the previous year. To meet the increasing demand for gas and future requirements, the Directors have entered into contracts for a complete new retort house and settings, the erection of which is now proceeding, and which will be completed by next winter. The Special Order of the Board of Trade referred to last year was granted on May 9, 1928, and under this the requisite new capital can be raised when and as desired. The balance standing to the credit of profit and loss account, after providing for interest on mortgage bonds, interim dividend of 3 p.ct. on the 6 p.ct. preference stock, interim dividend of 5 p.ct. on the "A" and "B" stock, and 3½ p.ct. on the "C" stock, and other charges, is £7699, from which the Directors recommend payment of final dividends for the year ended Dec. 31, 1928, of 5 p.ct. on the "A" and "B" stock, 3½ p.ct. on the "C" stock, and the final dividend of 3 p.ct. on the 6 p.ct. preference stock, subject to income-tax, which will absorb £2301, leaving £5398 to carry forward to next year.

The Chairman, proposing the adoption of the report, said the balance standing to the credit of the profit and loss account for the year was £7699. They had written off £600 on the new capital issue, placed £600 to the special purposes fund, which now stood at £4200; the benefits fund had been augmented by £125, bringing it to £1100; there was no addition to the repairs suspense account, which was now £3000; and to the reserve account they proposed to add £1000, bringing the total to £6600.

Mr. Smith seconded the adoption of the report and accounts.

On the motion of the Chairman, seconded by Mr. Rogers, dividends as recommended in the Directors' report were declared.

Mr. John Blacknell called attention to the large amount of gas unaccounted for.

The Chairman replied that they were aware that the amount was large, and the matter was being carefully investigated by Mr. Gill.

Mr. Blacknell: Is it due to bad mains?

The Chairman: We cannot say yet. It may be mains and it may be meters.

Mr. Dunbar pointed out that the quantity of gas unaccounted for was 7·19 p.ct. less than last year.

The Chairman: That is satisfactory so far, but the whole question is being carefully investigated.

On the motion of Mr. Butcher, seconded by Mr. Blacknell, a vote of thanks was accorded the Directors for their services.

EAST HAM TECHNICAL COLLEGE.

Visit to the Luton Works of the Davis Stove Company, Ltd.

The East Ham Technical College is a "live" Institution which has for its object the training of its members in gas supply and gas fitting. The work is carried on under the auspices of the Institution of Gas Engineers and the City and Guilds of London Institute; and the students are drawn from all the large gas undertakings in the London district.

On Tuesday, April 30, a party of about seventy students of the College paid a visit to the Luton Works of the Davis Gas Stove Company, Ltd. The four instructors from the College who went along with the party were: Messrs. S. T. Phillips (Senior Lecturer in the Gas School), T. V. Garrud (of the Gas Light and Coke Company, and Hackney Technical Institute; Lecturer in Gas Supply), and R. E. Mobbs and G. W. West (of Westminster Technical Institute).

The visitors were conveyed from Luton Station to the Davis Athletic and Social Club (adjoining the works), where they were welcomed by the Managing Directors, Mr. H. Newsome Davis and Mr. Cyril G. Davis. They were then formed into parties for a tour of the works, under the guidance of leading officials of the firm.

The works, occupying sixteen acres, are planned and equipped on the most modern and efficient lines. To save labour in the handling of the goods, they have been built in the shape of a horse-shoe. At one end is an inward, and at the other end an outward, railway siding. Pig iron and other raw materials are brought in at the one end and conveyed from one department to the next as they are subjected to the different processes of manufacture, eventually to emerge at the other end in the form of finished articles, ready to be transported.

After seeing the pattern shop and store, where thousands of patterns of all sizes are stored, and can be brought to light in a few minutes, when required, the visitors inspected the foundry or moulding shop, which, it is claimed, is one of the largest engaged in the production of light castings in the country. It covers a floor area of about 3 acres. At the inward siding the visitor was impressed by the ingenious planning which makes possible a continuously progressive course from the arrival of the raw material to the dispatch of the finished article. The raw material arriving on the inwards siding is deposited near the two cupolas which supply the foundry. Each cupola is capable of melting seventy tons of metal a day, and from them, in bogies suspended by an overhead runway, the molten metal is conveyed to the moulders. In the sand shop, adjacent to the cupolas, is a sand-mixing and milling plant, in which the sand is prepared for use in the foundry.

Castings are conveyed from the foundry into the dressing shop for cleaning. This department was completely re-organized last year, and is now one of the finest dressing shops in the country. The main drive is underground, so that the belts are kept away from the operatives, and all the machinery is "exhausted" to carry away the light dust, which is bad for the health and comfort of the workers. Castings are cleaned by sand-blasting or rumbling, according to their nature.

In the passing shop the castings are subjected to a rigorous inspection. All tap-rail castings are tested under pressure, and any castings in which defects are discovered are rejected and scrapped.

The department for japanning or stove enamelling has recently been considerably enlarged, and modernized by the installation of the most up-to-date gas-heated ovens.

In the testing shop the completed stoves are subjected to the closest inspection, and the gas consumption of every burner is carefully tested by scientific methods. In the dispatch warehouse, the fitted stoves are stored, ready to be finally blacked or otherwise finished as required, and equipped with the necessary accessories.

The next places of interest were the sheet metal and enamelling departments, which are also arranged to reduce handling to a minimum. Particular interest was shown in the porcelain enamelling department, where five large muffle furnaces are in operation day and night to maintain the supply of enamelled plates necessary to meet the growing demand of recent years for gas cookers with enamelled interiors and exteriors; and of castings in the attractive and durable "Rado" enamel finish, which is now so popular a feature of the more modern "Alpine New-World" and other patterns.

When the tour of the works had been completed, the party adjourned to the Davis Athletic and Social Club for tea.

Mr. H. N. Davis expressed the firm's pleasure at the presence of the members of the East Ham Technical College. Never had he taken a party of visitors round the works who had shown more intelligent interest and asked more intelligent questions than had the visitors that day; and this, he was sure, was due in no small measure to the work of East Ham Technical College. Every day science was playing a more important part in industry. The old "rule-of-thumb" methods that prevailed in his young days would not do now; and science and technique to-day were really fundamental in every progressive industry. Mr. Davis said the work they were carrying on to a certain extent looked simple; but he thought they would agree with him that anything extremely well done appeared simple.

Mr. Phillips, responding on behalf of the East Ham Technical College, expressed the thanks of those present for the kind invitation extended to them, and readily accepted, to visit the works, and for the great hospitality which had been shown to them. He considered there were three lessons they could take from what they had seen in their tour of the works. First of all, the accuracy and precision displayed in every part of the process; secondly, the broad-minded view of the Davis Gas Stove Company; and thirdly, the continuous forward movement in the works.

Mr. Garrud supported what Mr. Phillips had said. He also thought they should express their appreciation of the efforts of Mr. Phillips in arranging the visit.

Mr. Phillips said he was only too pleased to do what he could in this direction. He would like particularly to express their appreciation of the Gas Light and Coke Company; because it was owing to their help that half those present had been able to come down. Mr. Lacey had made arrangements whereby these men could work overtime, and thus have the time off for this visit without loss of pay; and such action was much appreciated.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *May 6.*

Considerable interest is still shown with regard to pitch, especially for next season; and the price of this product is called 35s. to 36s. per ton f.o.b.

Creosote for export remains unchanged at about 6¾d. per gallon f.o.b.

Pure benzole is 2s. per gallon, and pure toluole about 2s. 2d.

There is not very much demand for solvent naphtha, and the price of the 95/160 grade is nominally about 1s. 7d. per gallon.

Tar Products in the Provinces.

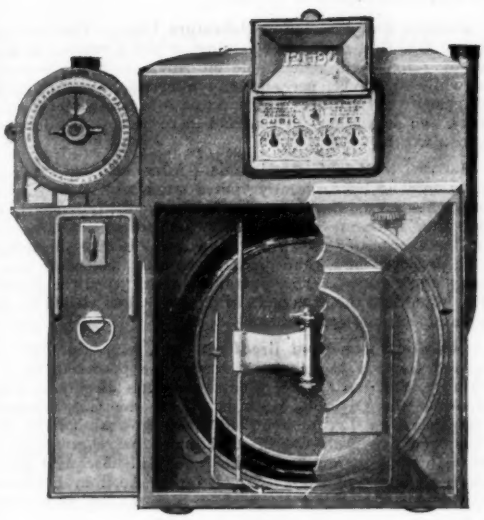
May 6.

The average prices of gas-works products during the week were: Gas-works tar, 17s. 6d. to 22s. 6d. Pitch—East Coast, 32s. 6d. to 33s. 6d. f.o.b. West Coast—Manchester, 27s. 6d. to 28s.; Liverpool, 29s. 6d. to 30s. 6d.; Clyde, 29s. 6d. to 30s. 6d. Toluole, naked, North, 1s. 7¼d. to 1s. 8½d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 3¾d. to 1s. 4¼d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid or salty, 3¼d. to 3¾d.; low gravity, 3d. to 3¼d.; Scotland, 3¼d. to 3¾d. Heavy oils, in bulk, North, 6d. to 6¼d. Carbolic acid, 60 p.ct., 1s. 10d. to 1s. 10½d. prompt. Naphthalene, £13 to £15. Salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Benzole Prices.

The following are considered to be the market prices to-day:

	s. d.	s. d.	
Crude benzole	1 0	to 1 1	per gallon at works
Motor ,,	1 7	,, 1 8	,, ,, ,,
90 p.ct. ,,	1 9	,, 1 10	,, ,, ,,
Pure ,,	2 0	,, 2 1	,, ,, ,,



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A METER
IS THE BELLOWS.

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COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

While the market for Northumberland coals is inclined to ease, Durhams on the whole remain remarkably steady, and it certainly appears as though May will be a satisfactory month. Gas coals are in exceptionally good demand for the time of year; presumably gas-works, especially on the Continent, have not yet made good the depletion in stocks caused by the exceptional winter. Coking coal remains the firmest spot of all, and is being booked well ahead at good prices.

Wear Special gas coals are quoted at 16s. 6d. f.o.b., and best qualities at 15s. 9d. The strike at one of the Wear collieries continues, and the output is consequently still below normal. Second-class is 15s. to 15s. 6d., unscreened coking is 15s. 9d. to 16s. Bunkers are quiet. Best qualities are steady at 16s. to 16s. 6d., and seconds fairly easy at 15s. to 15s. 3d. Northumberland steams are meeting with keen Continental competition again, and quotations are lower at 14s. 6d. to 15s. for prompt best screened sorts, with 14s. 3d. asked for positions further ahead.

Gas coke is quiet, and 19s. to 19s. 6d. f.o.b. is asked for shipment.

YORKSHIRE AND LANCASHIRE.

As a result of restricted working at the collieries, surplus stock has been rapidly disposed of. The output of gas coal is more equal to the consumption, and contract deliveries appear to be adequate to requirements.

Buyers are only covering immediate requirements, and although forward inquiry shows activity, collieries are not disposed to accept contracts beyond the next few months. On prompt account best hards are 17s. to 17s. 3d. per ton f.o.b. Industrial fuels maintain recent values, and export conditions remain unaltered.

The following are Humber bunker and export prices, f.o.b. usual shipping ports:

South Yorkshire—Hards, Association, bunkers 20s. 6d. to 20s. 9d., export 16s. 6d. to 17s.; screened gas coal, export 17s. to 17s. 6d.; washed trebles, export 16s. to 16s. 6d.; washed doubles, bunkers 19s., export 15s. 6d.; washed singles, export 14s. 6d. to 15s.; washed smalls, bunkers 15s., export 12s.; rough slack, bunkers 13s. 6d. to 13s. 9d., export 11s. to 11s. 6d.; smithy peas, export 17s. to 18s.

West Yorkshire—Hartley's (f.o.b. Goole), bunkers 17s. 6d., export 15s. 6d. to 16s.; screened gas coal, export 17s.; washed trebles, export 15s. 6d. to 16s.; washed doubles, export 15s.; washed singles, export 14s. 6d.; washed smalls, bunkers 14s. 9d., export 11s. to 11s. 6d.; unwashed trebles, export 15s. 6d. to 16s.; unwashed doubles, export 13s. to 13s. 9d.; rough slack, bunkers 13s. 6d., export 9s. 6d. to 10s.; coking smalls, export 9s. 6d. to 10s.

Derbyshire and Nottinghamshire—Top hards, bunkers 20s. to 20s. 9d., export 16s. to 17s.; cobbles, bunkers 19s. to 19s. 6d., export 15s. to 16s.; washed trebles, export 15s. 6d. to 16s.; washed doubles, export 14s. 9d. to 15s. 3d.; washed singles, export 14s. 3d. to 14s. 9d.; washed smalls, bunkers 14s. 9d. to 15s., export 11s. 6d.; unwashed doubles, export 14s. to 14s. 6d.; rough slack, bunkers 13s. 3d. to 13s. 9d., export 9s. 6d. to 10s. 3d.

Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, bunkers 17s. to 18s., export 15s. to 16s.; gas coke, export 19s. 6d. to 21s. 6d.; furnace coke, export 20s.; washed steam (Goole, West Yorkshire), bunkers 18s.; (Hull, West Yorkshire), bunkers 18s. 6d.; (Hull, South Yorkshire), bunkers 18s. 9d., export 16s.

MIDLANDS.

The arrangement of yearly contracts for gas coal from mid-summer has proceeded apace. Terms vary according to size of contract, specifications, and location, ranging from about 13s. 6d. for single screened nuts up to 16s. for best. The advance on the current year's contract rates averages about 1s. There is the usual seasonal falling off in deliveries now. Gas-works generally have good reserves.

In the industrial section prices are stationary for the most part, and business is quiet. Collieries notified reductions in house coal from the beginning of May varying from 1s. 6d. to 3s. 6d., the mean being about 2s. In some instances it was intimated that the reductions represented the full extent of the revision for the summer. These readjustments leave the current rates from 1s. 6d. to 2s. above last year's summer prices. Coalowners hope that the Five Counties Scheme will prove its efficacy in the maintenance of this improvement. The output quota for May has been fixed at 60 p.ct. of standard. Some of last month's output has gone into stock, but in exceptional cases there are pits where the quota was insufficient to meet demand.

The excess of slacks and smalls has been absorbed. With a much reduced output, a normal balance is now re-established.

CONTRACTS OPEN.

Pipes, Lanterns, Gas Fittings, and General Stores.

The Gas Committee of the City of Leeds invite tenders for the above and other general stores. [See advert. on p. 365.]

Meters.

The Gas Committee of the City of Leeds invite tenders for the supply of standard and prepayment dry meters. [See advert. on p. 365.]

Paint and Painting.

The Borough of Bexhill Gas Department invite tenders for the supply of paint and the outdoor painting at the works. [See advert. on p. 366.]

Price Reduction at Penzance.—The Penzance Gas Company announce a further reduction in the price of gas, after the reading of the meters for the next quarter, of 3d. per 1000 c.ft.

Dale & Co. (Chemicals), Ltd., of Tyldesley, Lancs., has been registered as a private Company, with a nominal capital of £6000, for the purpose of carrying on a business of tar distillers, &c.

Coal Carbonisation, Ltd., of 15, St. Helens Place, E.C., has been registered as a private Company, with a nominal capital of £100, to acquire licence in respect of certain existing inventions relating to low-temperature carbonization of coal; and to enter into an agreement with the Leeds Fireclay Company, Ltd.

Chemical Reactions, Ltd., has been registered as a private Company, with a nominal capital of £50,000, to carry out research work on the bye-products obtained from the distillation of coal or any other material, &c. Among the Directors is Sir David Milne-Watson, the Governor of the Gas Light and Coke Company.

Road Tar Contracts.—Contracts for the supply of liquid tar for road repairs have been concluded by the South Metropolitan Gas Company with nearly 50 local authorities in Southern England. These supplies are now being delivered to five county councils, eleven borough councils, twelve urban district councils, and nineteen rural district councils.

New Coal Distillation Plant.—The Magdelena Securities, Ltd., owners of the British rights on the Vandegrift coal distillation process, have arranged with Holtz & Co. and Foster Wheeler, Ltd., to commence forthwith the foundations for the first 200-ton daily capacity unit of plant at the Cannock and Leacroft Colliery, Cannock, near Wolverhampton.

Tenders for Guildford Stock Issue.—The tenders for the £21,500 5 p.ct. debenture stock offered by Messrs. A. & W. Richards, on behalf of the Directors of the Guildford Gas Light and Coke Company (see "Journal" for April 24, p. 212), were opened on May 1. The total amount applied for was £57,175 at prices ranging from £100 down to the minimum of £91 per £100.

Molex Products, Ltd., of 16, Northumberland Avenue, W.C. 2, has been registered as a private Company, for the purpose of forming an agreement with the Whitlay Tool Company, Ltd., for the purchase of the business of manufacturers of and dealers in steam and gas packing, together with the trade mark "Molex," and manufacturers of cements, &c. The nominal capital is £1500.

New Meter Testing Department at Newcastle.—A new Corporation gas meter testing department in City Road, Newcastle, was declared open on April 26 by Councillor J. L. Gibbin, wife of the Chairman of the Weights and Measures Department Committee. The cost of the building and machinery is £4500. Up to now the testing has been carried out at the Weights and Measures Office, but larger premises were necessitated by the development of the work. All defects associated with the old testing building have been remedied in the new one. The opening ceremony was presided over by Alderman R. H. Millican (Chairman of the Watch Committee). Councillor E. Gibbin, in an address, said it was curious that while gas companies were compelled to have tests by independent authorities, the same thing did not apply to electrical meters. It seemed to him that electrical companies should be placed in the same position as gas companies.

Sheffield's Ex-Service Men's Gathering.—Formed less than a year ago with the object of bringing together ex-service men of all departments and of promoting comradeship, the Sheffield Gas Company's Ex-Service Men's Association is making commendable progress, and at the annual dinner, held on April 26 at the Shakespeare Hotel, West Bar, there was an attendance of about ninety. Mr. F. L. Watson, Chief Accountant, presided, and Mr. B. Dalton, of the Shakespeare Hotel, who was for a number of years a foreman in the employ of the Company, supervised the catering arrangements. The Chairman said that a gathering of that kind, at which representatives of various branches of the undertaking were able to meet, did an enormous amount of good. Mr. W. H. Ibbotson, proposing the toast, "The Association," said it sought to encourage the spirit of comradeship which characterized the nation at large during the war years. There were many ways in which that spirit could be revived to-day. Mr. J. H. Turnbull responded.

Wimborne Minster Gas Company Report.—The Chairman, in moving the adoption of the report and balance-sheet, mentioned that the sales of gas during the past year again constituted a record, the total sold during 1928 amounting to over 39 million c.ft. The price at which gas was now supplied in Wimborne—namely, 3s. 9d. per 1000 c.ft.—was an exceedingly low one for companies of this size in the South of England. There were now 1300 consumers on the Company's district, and these had in use over 1200 gas cookers and fires. The slot meter section of the Company's business continued to develop, the total amount taken from these meters during the year, after the return of the rebate to consumers, amounting to £4270. Considerable improvements have been effected in the system of mains during the year to enable the Company more readily to meet the increased demand for gas. During the exceptionally cold weather in February, new records in the quantity of gas made and sent out were being made each day. The Directors recommended a dividend at the usual rate of 3 p.ct. on the preference shares; 7½ p.ct. on the ordinary shares; and £5 5s. p.ct. on the additional ordinary "B" shares, *less* income-tax, for the half-year ended Dec. 31 last; that a sum of £151 be carried to the reserve fund; and that the balance be carried forward. As foreshadowed in the last report of the Directors, the price of gas was reduced during the year, from 10·4d. to 9·6d. per therm (4s. 4d. to 4s. per 1000 c.ft.), and has again been reduced to 9d. per therm (3s. 9d. per 1000 c.ft.) as from the New Year.

British Silica Company, Ltd., of Westminster Chambers, 1, Victoria Street, S.W. 1, has been registered as a private Company, with a nominal capital of £1000.

Colonial Gas Association Debenture Issue.—The Directors of the Colonial Gas Association are issuing at par £125,000 in 1250 debentures of £100 each, redeemable on Nov. 16, 1939, bearing interest meanwhile at 6 p.ct. per annum. Subscribers in Australia will receive priority of treatment in respect of 1000 debentures (*i.e.*, £100,000 worth), and subscribers in England in respect of 250 debentures (*i.e.*, £25,000 worth).

Barrow to Adopt Horizontals.—After hearing the report of a deputation who have recently visited gas-works at Devonport, Portsmouth, Stretford, Burnley, Halifax, Elland, Longwood, Clitheroe, Harrogate, Lytham, and Carlisle, the Barrow-in-Furness Corporation Gas Committee recommend the installation of horizontal retorts at the proposed new centralized gas-works, whichever site is subsequently agreed upon. The Committee have asked the Town Clerk to convey thanks to the Managers of the gas-works visited for their courtesy and helpfulness to the deputation.

Exhibition Results at Bradford.—Mr. E. J. Sutcliffe, Gas Engineer and General Manager at Bradford, reported to his Committee on May 3, that during the recent fortnight's display at a trades' exhibition at the Olympia Hall, Bradford, the Gas Department had taken orders for 123 cookers, 26 fires, 25 wash-boilers, four water boilers, and two radiators—a total which he regarded as very satisfactory, having in mind also the probable subsequent effects of the publicity. The production of gas during April in Bradford totalled 172,545,000 c.ft., an increase of 2·80 p.ct. on the production in April last year.

Improved Street Lighting at Halifax.—The Halifax Corporation are improving the gas lighting in some main thoroughfares, to the number of 400 lamps out of the 5300 gas lamps in use in the Borough. In King Cross Lane 37 lamps are being increased to four-light lamps, with the mantles ranging in the line of the path instead of clustered; and the height of the posts is being increased by 2 ft., to allow greater spread of the light. The remaining 363 lamps being improved are having the mantles increased from one or two (as at present) to three, but the height of the posts is not being raised in these cases.

Presentation at Gloucester.—An interesting little ceremony took place at the Offices of the Gloucester Gas Light Company, when Mr. Frank Jones, who has been collector in the service of the Company for over 38 years, and who, owing to advancing years, has now retired on a pension granted to him by the Directors, was presented by the Secretary (Mr. T. B. James), and staff, with an armchair as a memento of the pleasant and amiable associations which had existed between them and Mr. Jones during the period they had worked together. Mr. James, who handed over the gift, expressed on behalf of the subscribers the hope that Mr. Jones would for a long time enjoy the rest and peace which he had so well earned.

Wolstanton Gas Committee.—In moving the adoption of the minutes of the Gas Committee at a meeting of the Wolstanton Urban Council, Mr. Hassam (Chairman) said the new gasholder, which had cost nearly £20,000, had been completed, and was working satisfactorily. The Committee, he said, had taken upon themselves the big burden of meeting that expenditure out of revenue, extending over six years. He was sure that the erection of the new holder had thrown a large amount of extra work upon the Manager and his staff, and the Gas Committee had therefore recommended increases of £25 a year for the Gas Manager and £20 a year each for three other officials. After some little discussion the three increases of £20 were approved, but that of £25 to the Gas Manager was referred back.

Gas Meter Testing in Birmingham.—In a report of the Birmingham Gas Testing Committee of Justices for the past year, it is stated that the number of meters tested during the year totalled 91,582, against 106,209 last year. The decrease is due to the general falling-off in the demand for gas meters, and it is understood that similar conditions are being experienced by most meter testing stations throughout the country. The general analysis of meters tested reads: Wet meters, tested and stamped, 7273; rejected, 3·2 p.ct.; dry meters, tested and stamped, 8138; rejected, 3·19 p.ct. The fees received are lower than last year by £855 15s. 9d. The Committee state that the general efficiency of the Department continues to be satisfactory, and it is reported that another firm has recently commenced the manufacture of gas meters in the city.

Annual Report on the Belfast Gas Undertaking.—Record profits by the Belfast gas undertaking are recorded by the Auditor in his annual report, upon which he has received the congratulations of the Corporation. The gross profit on the manufacture and the sale of gas and residuals amounted to £184,106—a sum greatly in excess of the profits in any previous year in the history of the undertaking. This figure compares with a profit of £68,866 for the year 1927, and £115,527 for 1926. The price of gas to consumers in the city who make prompt payment was 2s. 8d. per 1000 c.ft. from April 1 to June 30, 1927, and 2s. 4d. from July 1 to the end of last year. The price has now been further reduced to 2s. 2d. per 1000 c.ft. In addition to the profits, there was other income from dividends, interest, rents, &c., amounting to £19,030, bringing the surplus on the year up to £203,136. After payment of loan charges and statutory contributions to redemption funds, amounting to £96,967, and clearing off a debit balance on the profit and loss account of £15,788, carried forward from the previous year, the Committee were in a position to transfer £35,000 to the meters depreciation account, £13,000 to contingent renewal fund, £3200 to the insurance fund, and to hand over to the city fund £22,890 to meet two years' interest and sinking fund charges in the stock issued for the erection and completion of the City Hall.

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. May 3.	Rise or Fall on Week.	Transactions Lowest and Highest Prices.
£			%p.a	% p.a.				
171,978	Stk.	Feb. 7	5	5	Aldershot 5 p.c. max. C.	70—75	..	..
412,992	,,	,,	4	4	Do. 4 p.c. Pref.	73—76	..	..
1,651,848	,,	Apl. 11	7⅛	7⅛	Alliance & Dublin Ord.	97—100	..	98
374,000	,,	Jan. 10	4	4	Do. 4 p.c. Deb.	68—68	..	..
533,555	,,	Mar. 7	7	7	Barnet Ord. 7 p.c.	112—115	..	..
800,000	1	Oct. 11	1/7½	1/4⅜	Bombay, Ltd.	20/—22/-	..	..
172,500	10	Mar. 7	8½	9	Bournemouth 5 p.c.	13—13½	+½	13 1/16—13½
600,050	10	,,	7	7	Do. B 7 p.c.	12⅝—12⅞	..	12⅝—12 13/16
439,160	10	,,	6	6	Do. Pref. 6 p.c.	10¾—11½	..	..
60,000	Stk.	Jan. 10	3	3	Do. 3 p.c. Deb.	55—68	..	..
169,025	,,	,,	4	4	Do. 4 p.c. Deb.	74—77	..	75
857,900	,,	Mar. 21	7½	7½	Brighton & Hove 6 p.c. Con.	113—116	..	..
371,880	,,	,,	6⅔	6⅔	Do. 5 p.c. Con.	99—102	..	..
1,987,500	,,	Feb. 21	5	5	Bristol 5 p.c. max.	93½—93¾	+1⅛	..
845,000	,,	Apl. 11	8	7½	British Ord.	116—119	..	117½—118½
100,000	,,	Dec. 20	7	7	Do. 7 p.c. Pref.	115—120	..	..
190,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	73—76	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Red. Deb.	93—96	..	95½
100,000	10	Dec. 6	8	6	Cape Town, Ltd.	8—9	..	..
100,000	10	Apl. 24	4½	4½	Do. 4½ p.c. Pref.	6½—7½*	..	6¾—7
150,000	Stk.	Dec. 20	4½	4½	Do. 4½ p.c. Deb.	73—78	..	..
696,880	,,	Feb. 21	6	6	Cardiff Con. Ord.	97—100	..	..
937,850	,,	Jan. 10	7½	7½	Do. 7½ p.c. Red. Deb.	100—103	..	102½
187,150	,,	Feb. 21	5	6½	Chester 5 p.c. Ord.	88—93½	..	..
98,936	1	Oct. 11	12/-	12/-	Colombo Ltd. Ord.	36/—38/-	..	..
24,495	1	,,	1/4⅜	1/4⅜	Do. 7 p.c. Pref.	21/—23/-	..	..
375,402	1	Apl. 11	1/93	1/9½	Colonial Gas Assn. Ld. Ord	24/—26/-	..	..
187,848	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	20/6—22 6	+-/6	..
1,073,280	Stk.	Feb. 21	5	7	Commercial Ord.	98—101	..	98½—99½
475,000	,,	Dec. 20	3	3	Do 3 p.c. Deb.	56—59	..	..
600,000	,,	Sept. 27	11	11	Continental Union, Ltd.	126—131	..	127—130½
200,000	,,	,,	7	7	Do. 7 p.c. Pref.	125—130	..	126—128
787,560	,,	Feb. 21	7	7	Croydon sliding scale	110—113	..	..
469,100	,,	,,	5	5	Do. max. div.	83—86	..	..
542,270	,,	Mar. 7	7	10	Derby Con.	112—117*e*	..	..
55,000	,,	Dec. 20	4	4	Do. Deb.	70—72*e*	..	..
209,000	,,	Mar. 7	5	5	East Hull Ord. 5 p.c.	73—75	..	..
1,002,180	10	Mar. 21	†4	†7	European, Ltd.	17—19	—1	17½—18⅝
18,708,480	Stk.	Feb. 21	5½	5⅝	Gas Light & Coke 4 p.c. Ord.	19/—19/6*f*	..	19 -—19/4½
2,600,000	,,	,,	8¼	8½	Do. 8½ p.c. max.	63—65	..	63¾—64½
4,187,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	75—77	..	75½—76½
5,809,620	,,	Dec. 20	3	3	Do. 3 p.c. Con. Deb.	58½—60¼	..	59½—60½
3 842,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	98—101	..	101½
82,500	,,	Mar. 21	7	7	Hastings & St L. 5 p.c. Conv	98—103	..	..
238,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	80—85	..	..
70,000	10	Apl. 24	†10	†10	Hongkong & China, Ltd.	13½—14½*	..	..
218,200	Stk.	Mar 7	5½	6	Hornsey Con. 5½ p.c.	86—89	..	..
1,976,000	,,	Nov. 8	10	10	Imperial Continental Cap.	425—445	—10	425—452
228,180	,,	Feb. 7	8½	8½	Do. 8½ p.c. Red. Deb.	70—73	..	..
335,242	,,	Mar. 7	7½	8	Lea Bridge 6 p.c. Ord.	117—120	..	..
3,145,907	,,	Feb. 21	5½	6½	Liverpool 5 p.c. Ord.	94½—95½*b*	..	..
600,000	,,	Mar 21	7	7	Do. 7 p.c. Red. Pref.	102—104*b*	..	..
185,736	,,	Feb. 21	9	8	Maidstone 5 p.c. Cap.	124—129	..	128½—129
63,480	,,	Dec. 20	3	3	Do. 3 p.c. Deb.	54—57	..	..
75,000	5	Dec. 6	18	18	Malta & Mediterranean	6¾—6½	..	5⅞
392,000	—	Apl. 2	—	5½	Metrop'l'n (of Melbourne) 5½ p.c. Red. Deb.	99—101	+1	..
841,920	Stk.	Nov. 22	†7	†5	Montevideo, Ltd.	106—109	..	..
3,051,818	,,	Feb. 21	5	5⅜	Newcastle & Gateshead Con.	17/9—18/3*df*	..	..
682,856	,,	,,	4	4	Do. 4 p.c. Pref.	74½—75½*d*	..	..
691,705	,,	Dec. 20	8½	8½	Do. 8½ p.c. Deb.	69¼—70¼*d*	..	..
181,780	,,	Mar. 7	7/1/0	7/1/0	North Middlesex 6 p.c. Con.	105—110	..	108
800,000	,,	Apl. 24	9	7	Oriental, Ltd.	114—118*	..	..
188,190	,,	Dec. 20	7½	8	Plym'th & Ston'house 5 p.c.	112—115	..	..
424,416	,,	Feb. 21	7½	8½	Portsm'th Con. Stk. 4 p.c. Std.	113—118	..	..
241,446	,,	,,	5	5	Do. 5 p.c. max.	82—85	..	..
3,334,464	1	—	—	—	Primitiva Ord.	34/—36/-	+-/6	33/7½—36/6
244,500	100	Dec. 8	4	4	Do. 4 p.c. Red. Deb.	93—96	+2	94
695,000	Stk.	Jan. 24	4	4	Do. 4 p.c. Red. Deb. 1911	79—81	+1	..
416,345	,,	Dec. 20	4	4	Do. 4 p.c. Cons. Deb.	79—81	+1	..
150,000	10	Mar. 21	6	6	San Paulo 6 p.c. Pref.	8¼—9	+½	8⅝—8 13/16
1,736,968	Stk.	Mar. 21	6½	6⅔	Sheffield Cons.	103—111*e*	..	..
95,000	,,	Jan. 10	4	4	Do. 4 p.c. Deb.	74—77*e*	..	..
90,000	10	June 14	‡3	‡4	South African	4—6	..	..
6,809,895	Stk.	Feb. 21	5	7½	South Met. Ord.	104—106	—½	104½—105½
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	108—111	..	108—109
1,895,445	,,	Jan. 10	8	8	Do. 8 p.c. Deb.	58—60	..	..
734,000	,,	Mar 7	6½	6½	Do. 6½ p.c. Red. Db.	99—101	..	..
91,500	,,	Mar. 7	8½	8½	South Shields Con.	106⅝—107½*d*	..	..
1,643,795	,,	Feb. 21	6½	6⅔	South Suburban Ord. 5 p.c.	107—110	..	108⅜—109½
468,837	,,	Dec. 20	5	5	Do. 5 p.c. Deb.	97—100	..	97½
647,740	,,	Mar. 7	5	5	South'mpton Ord. 5 p.c. max.	77—80	..	..
137,275	,,	Dec. 20	4	4	Do. 4 p.c. Deb.	72—75	..	..
179,014	,,	Feb. 21	8	8	Sutton Ord.	116—119	..	..
250,000	,,	Feb. 21	7	7	Swansea 7 p.c. Red. Pref.	100—102	..	..
300,000	,,	Dec. 20	6½	6⅔	Do. 6⅔ p.c. Red. Deb.	100—102	..	..
1,002,275	,,	Mar. 7	—	6⅔	Tottenham District Ord.	105—108	..	106—108
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	97—100	..	..
191,255	,,	Dec. 6	4	4	Do. 4 p.c. Deb.	75—78	..	..
289,094	,,	Mar. 7	6⅔	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	93—98	..	94
98,880	,,	,,	5	5	Do. 5 p.c. pref.	85—90	..	..
80,000	,,	Feb. 21	8⅔	9	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	147—152	..	..
255,636	,,	,,	7½	7½	Do. B 3½ p.c.	125—130	..	..
432,535	,,	,,	6⅔	6⅔	Do. C and New	102—107	..	..
352,000	,,	,,	6⅔	7½	Do. Wimbledon 5 p.c.	115—120	..	..
98,000	,,	,,	7⅔	7⅔	Do. Epsom 5 p.c.	126—131	..	128
200,000	,,	,,	5	5	Do. 5 p.c. Pref	90—95	..	..
88,416	,,	Dec. 20	3	3	Do. 3 p.c. Deb.	56—59	..	..
334,743	,,	,,	4	4	Do. 4 p.c. Deb.	77—80	..	..
397,500	,,	,,	5	5	Do. 5 p.c. Deb.	97—100	..	..

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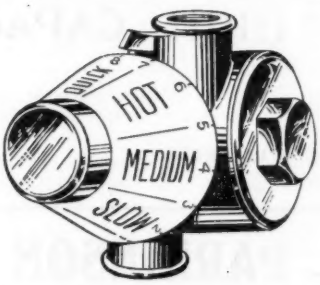

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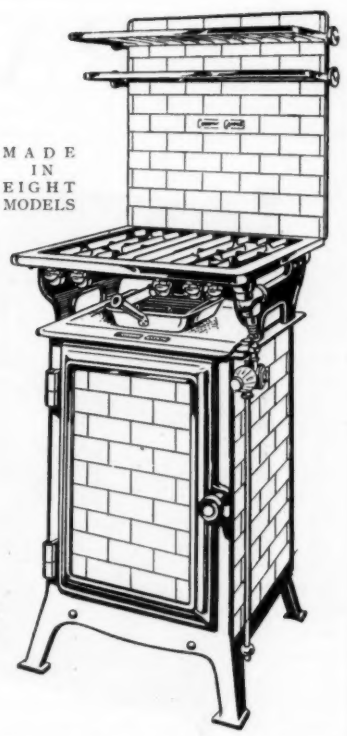

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